

# SUPPLEMENT.

# The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

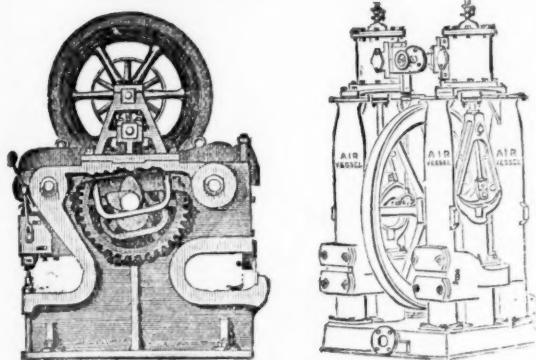
[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2244.—VOL. XLVIII.

LONDON, SATURDAY, AUGUST 24, 1878.

PRICE (WITH THE JOURNAL) SIXPENCE.  
PER ANNUM, BY POST, £1 4s.

JOHN CAMERON'S  
SPECIALITIES ARE ALL SIZES OF  
Steam Pumps, Shipbuilders' Tools,  
BAR SHEARS.  
ESTABLISHED 1852.



OLDFIELD ROAD IRON WORKS,  
SALFORD, MANCHESTER.

For Excellence  
and Practical Success  
of Engines



Represented by  
Model exhibited by  
this Firm.

HARVEY AND CO.  
ENGINEERS AND GENERAL MERCHANTS,  
HAYLE, CORNWALL,  
LONDON OFFICE, 186, GRESHAM HOUSE, E.C.

MANUFACTURERS OF

PUMPING and other LAND ENGINES and MARINE STEAM ENGINES  
of the largest and most approved kinds in use, SUGAR MACHINERY,  
MILLWORK, MINING MACHINERY, and MACHINERY IN GENERAL.  
SHIPBUILDERS IN WOOD AND IRON.

MANUFACTURERS OF

HUSBAND'S PATENT PNEUMATIC STAMPS.

SECONDHAND MINING MACHINERY FOR SALE.  
IN GOOD CONDITION, AT MODERATE PRICES—viz.,

PUMPING ENGINES; WINDING ENGINES; STAMPING ENGINES;  
STEAM CAPSTANS; ORE CRUSHERS; BOILERS and PITWORK of  
various sizes and descriptions; and all kinds of MATERIALS required for  
MINING PURPOSES.

THE  
PHOSPHOR BRONZE  
COMPANY (LIMITED).

189, CANNON STREET, E.C.  
LONDON.

Alloy, No. II., for pinions, ornamental castings, steam  
fittings, &c. £120 per ton  
" No. IV., for pinions, pumps, valves, linings,  
cylinders, &c. 130  
" No. VI. (must be cast in chill) for bolts, &c.  
This alloy has very great tensile strength ... 140  
" No. VII., for hydraulic pumps, valves, and  
plungers, piston rings, bushes and bearings,  
for steel shafts ... 140  
" No. XI., special phosphor-bronze bearing metal,  
wearing five times as long as gun metal ... 112  
The prices of castings vary according to the pattern, the quantity required, and  
the alloy used.

WIRE ROPES, TUBES OF ALL DESCRIPTIONS, &c.

STANDARD LUBRICATING OILS  
COMPANY, LIMITED.

DARK and PALE OILS for MACHINERY, RAILWAY, and MINING  
PURPOSES, from TWO SHILLINGS per gallon, and upwards.

AGENTS WANTED.  
1, DRAPERS' GARDENS, THROGMORTON AVENUE,  
LONDON, E.C.

ALEX. CHAPLIN AND CO.,  
CRANSTON HILL ENGINE WORKS, GLASGOW.

PATENTEE AND SOLE MANUFACTURERS OF  
CHAPLIN'S PATENT STEAM CRANES, HOISTS,  
LOCOMOTIVES, AND OTHER ENGINES AND BOILERS.

LONDON HOUSE—

MCKENDRICK, BALL, AND CO.,  
3, QUEEN VICTORIA STREET, LONDON, E.C.



PARIS,  
BRONZE MEDAL, 1867.



ORDER OF THE CROWN OF PRUSSIA.



FALMOUTH,  
SILVER MEDAL, 1867.

A DIPLOMA—HIGHEST OF ALL AWARDS—given by the  
Geographical Congress, Paris, 1875—M. Favre, Contractor, having  
exhibited the McLean Drill alone as the MODEL BORING MACHINE  
for the St. GOTTHARD TUNNEL.

SILVER MEDAL of the Highland and West of Scotland  
Agricultural Society, 1875—HIGHEST AWARD.

At the south end of the St. Gotthard Tunnel, where

## THE McKEAN ROCK DRILLS

Are exclusively used, the advance made during eight consecutive weeks, ending February 7, was 24-90, 27-60, 24-80, 26-10, 28-30, 27-10, 28-40, 28-70 metres. Total advance of south heading during January was 121-30 metres, or 133 yards.

In a series of comparative trials made at the St. Gotthard Tunnel, the McLean Rock Drill continued to work until the pressure was reduced to one-half atmosphere (7½ lbs.), showing almost the entire motive force to be available for the blow against the rock—a result of itself indicating many advantages.

The GREAT WESTERN RAILWAY has adopted these Machines for the SEVERN TUNNEL; the LONDON AND NORTH-WESTERN RAILWAY for the FESTINIOG TUNNEL; and the BRITISH GOVERNMENT for several Public Works. A considerable number of Mining Companies are now using them. Shafts and Galleries are driven at from three to six times the speed of hand labour, according to the size and number of machines employed, and with important saving in cost. The ratio of advantage over hand labour is greatest where the rock is hardest.

These Machines possess many advantages, which give them a value unapproached by any other system of Boring Machine.

THE McKEAN ROCK DRILL IS ATTAINING GENERAL USE THROUGHOUT THE WORLD FOR MINING, TUNNELLING, QUARRYING, AND SUB-MARINE BORING.

The McKEAN ROCK DRILLS are the most powerful—the most portable—the most durable—the most compact—of the best mechanical device. They contain the fewest parts—have no weak parts—act without SHOCK upon any of the operating parts—work with a lower pressure than any other Rock Drill—may be worked at a higher pressure than any other—may be run with safety to FIFTEEN HUNDRED STROKES PER MINUTE—do not require a mechanic to work them—are the smallest, shortest, and lightest of all machines—will give the longest feed without change of tool—work with long or short stroke at pleasure of operator.

The SAME Machine may be used for sinking, drifting, or open work. Their working parts are best protected against grit and accidents. The various methods of mounting them are the most efficient.

N.B.—Correspondents should state particulars as to character of work in hand in writing us for information, on receipt of which a special definite answer, with reference to our full illustrated catalogue, will be sent.

PORTABLE BOILERS, AIR COMPRESSORS, BORING STEEL,  
IRON, AND FLEXIBLE TUBING.

The McLean Drill may be seen in operation daily in London.

## McKEAN AND CO.

ENGINEERS.

OFFICES,

5, RUE SCRIBE, PARIS

MANUFACTURED FOR McKEAN AND CO. BY  
MESSRS. P. AND W. MACLELLAN, "CLUTHA IRONWORKS,"  
GLASGOW.

## SOLID DRAWN BRASS BOILER TUBES

FOR LOCOMOTIVE AND MARINE BOILERS

RATHER

MUNTZ'S OR GREEN'S PROCESS

MUNTZ'S METAL COMPANY (LIMITED),  
FRENCH WALLS,

NEAR BIRMINGHAM.

## DARLINGTON WAGON COMPANY, MANUFACTURERS OF RAILWAY WAGONS

OF EVERY DESCRIPTION,

For Cash, or on Deferred Payments, or Hire.  
REPAIRS EXECUTED WITH DESPATCH, ON REASONABLE TERMS.  
OFFICES AND WORKS.

ALBERT HILL, DARLINGTON.

## DUNN'S ROCK DRILL, AND AIR COMPRESSORS.

FOR DRIVING BED ROCK  
TUNNELS, SINKING  
SHAFTS, AND PERFORMING  
OPEN FIELD OPERATIONS,  
IS THE  
CHEAPEST, SIMPLEST,  
STRONGEST, & MOST EFFECTIVE  
DRILL IN THE WORLD.

Dunn's Patent Rock Drill Company

(LIMITED).

OFFICE, 193, GOSWELL ROAD  
LONDON, E.C.

PATENT

## "INGERSOLL ROCK DRILL," LE GROS, MAYNE, LEAVER, & CO.,

60, Queen Victoria Street, London, E.C.

5, PARK PLACE, NEW YORK, U.S.A.

We claim 40 per cent. greater effective drilling power, and offer to compete with any machine of its class.



The following extracts from the reports of Judges in awarding Medals:—

"2. Its simple construction ensures durability, &c."

"4.—The steam or

air cushions at each end of cylinder effectively protect from injury

"5. Its having an automatic feed, giving it a steady motion, &c."

"6. Its greater steadiness and absence of jar and vibration experienced in other drills, which is very destructive to their working parts, &c."

"7. Its greater power is some FORTY PER CENT. in favour of the Ingersoll."

Medals awarded for several years in succession "For the reason

that we adjudge it so important in its use and complete in its construction as to supplant every article previously used for accom-

plishing the same purpose."

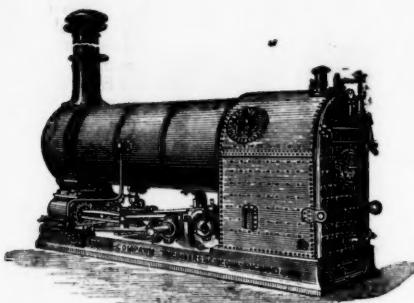
Estimates given for Air Compressors and all kinds of Mining

Machinery. Send for Illustrated Catalogues Price Lists, Testi-

monials, &c., as above.

# ROBEY & CO., ENGINEERS, LINCOLN,

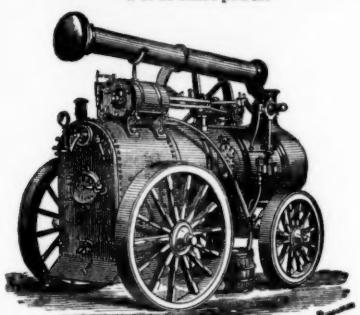
SOLE MANUFACTURERS OF THE



THE PATENT ROBEY FIXED ENGINE AND LOCOMOTIVE BOILER COMBINED, 4 to 50-horse power.

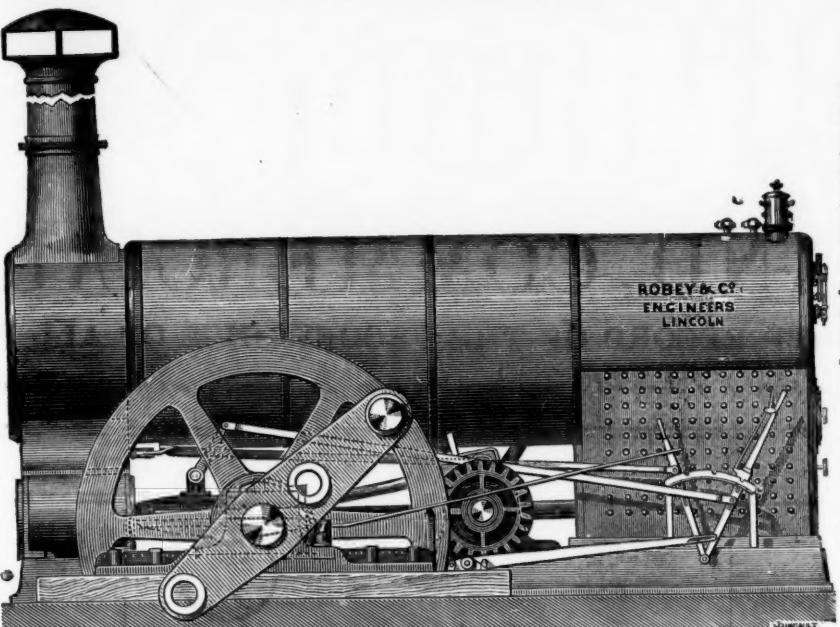


VERTICAL STATIONARY STEAM ENGINE AND PATENT BOILER COMBINED, 2 to 12 horse power.



SUPERIOR PORTABLE ENGINES, 4 to 50-horse power.

No Expensive Brick Buildings or High Chimney required.



## PATENT IMPROVED ROBEY MINING ENGINE

OF ALL SIZES, FROM 4 TO 50-HORSE POWER.

Some of the advantages of this New Engine are as follows:—

SMALL FIRST COST. SAVING OF TIME AND EXPENSE IN ERECTING. EASE, SAFETY, AND ECONOMY IN WORKING. GREAT SAVING IN FUEL.

This New Engine is free from all the objections that can be urged against using the Semi-Portable Engine for permanent work, because it possesses the rigidity and durability of the Horizontal Engine, and at the same time retains the advantages of the Semi-Portable in saving time and expense in fixing.

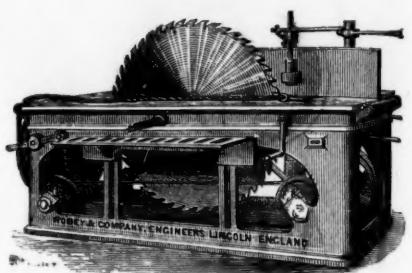
## THE PATENT ROBEY FIXED ENGINE

(Also above illustrated) is admirably adapted for driving Rolling Mills, Saw Mills, Brick Machinery, Pumping Machinery, and all descriptions of Fixed Machinery.

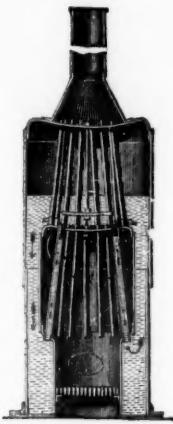
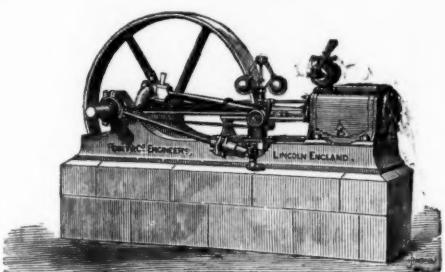
ENGINES UP TO 200 EFFECTIVE HORSE-POWER  
ALWAYS IN PROGRESS.

Prices and full particulars of all the Machinery here illustrated on application to the Sole Manufacturers,

**ROBEY & CO.,  
ENGINEERS, LINCOLN, ENGLAND.  
London Office: 117, Cannon Street, London, E.C.**



SELF-ACTING CIRCULAR SAW BENCH.

PATENT VERTICAL BOILERS,  
2 to 12 horse power.IMPROVED HORIZONTAL FIXED STEAM  
ENGINE,  
4 to 50-horse power.

## MECHANICAL VENTILATION OF MINES.

THE UNION ENGINEERING COMPANY (C. SCHIELE AND CO.) undertake the Construction and Erection of their Colliery Ventilation Fans, of all sizes up to the largest required quantities of air. The leading features of their system are now generally known. Some of the specialities are: The absence of necessity for costly erections in masonry and brickwork: the small space required for the Machines, and the moderate first cost of the whole.

As the Fans are in a great measure self-contained, the necessary seats and connection with Pit are of a simple and inexpensive character. They can be arranged to be placed below ground when required, and also to work on

Drawing Shafts. Certain sizes are often used to assist in Furnaces, with good effect.

[Estimated and further information will be prepared on receipt of the necessary particulars].

FOR SINKING PURPOSES, and also for places where small quantities of air are needed for Ventilating purposes, a Special Fan is made, in various sizes, with small engine combined, complete, arranged for both forcing and exhausting air.

NOISELESS BLOWING FANS, for Smithy Fires, and other purposes.

COAL-CUTTING MACHINERY, WINDING, HAULING, AND OTHER DESCRIPTIONS OF STEAM-ENGINES.

**THE UNION ENGINEERING COMPANY (C. SCHIELE & CO.),  
PNEUMATIC AND HYDRAULIC ENGINEERS,  
(SOLE PROPRIETORS AND MAKERS OF SCHIELE'S LATEST PATENTS),**

2. CLARENCE BUILDINGS. BOOTH STREET. MANCHESTER.

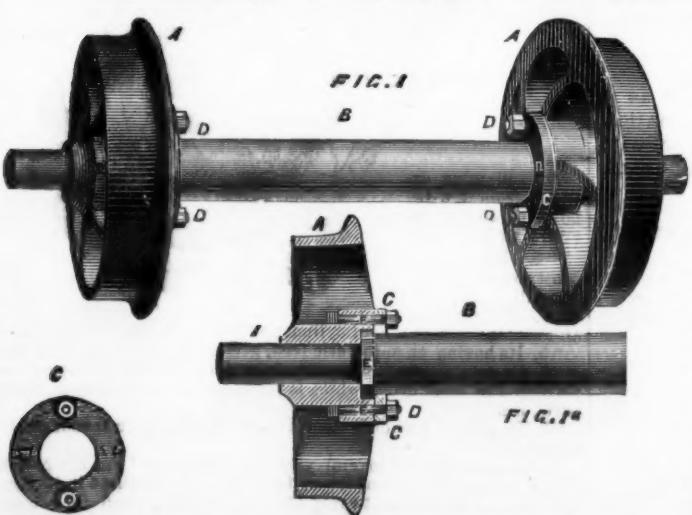
TURBINE WATER-WHEELS, specially designed and adapted for use in Coal Mines, for high falls of water, for the purpose of developing water power, where it is available, for use in hauling, pumping, and other works.

The Firm, having had an experience of nearly twenty-five years exclusively in the above Special Departments of Engineering, are prepared to advise on any matter affecting the application of Fans or Water Power in Collieries or elsewhere.

## JOSEPH FENTON & SONS,

MANUFACTURERS OF  
CAST STEEL AND FILES,  
AND

CRUCIBLE CAST STEEL CASTINGS,  
Sykes Works, Eyre-st. & Bridge-st., Sheffield. London Office: 118, Cannon-st., E.C.  
A New Patent Method of Fitting up Wheels and Axles.



Figs. 1 and 1a show a longitudinal view and plan of a pair of cast wheels and axles fitted up for outside bearings, and Figs. 2 and 2a for inside bearings. A A are the wheels; B, the axle; C C, the washers; D D, the bolts; E, the collar on axle B; and F, the recessed boss in the wheel.

The wheel is cast with a recessed boss in the inside, made to any shape, corresponding in shape and depth with a collar formed on the axle, which is forged of solid steel; the axle is secured into the recess partly by being sufficiently tightly fitted to require driving home with a hammer, and partly by the washer. Around the axle adjoining the boss is fixed the washer, made in two parts and dovetailed, so as to allow of being fixed after the collar has been forged on the axle. The washer is secured to the boss by bolts and nuts, both in outside and inside bearings; in the case of inside, by means of lugs cast on the boss, and the washer made of corresponding shape; the washer is made of crucible cast steel. The only tool required for fitting is an ordinary spanner for outside bearings, and a box spanner for inside bearings.

Now what are the advantages of this method? You secure a simple way of fitting—it can be done by anyone who has seen it—the only tool required being a spanner; the wheels can be detached from or secured to the axle in a few minutes. The next

advantage is the perfect solidity attained, the wheel and axle practically becoming as one piece. The durability results from the toughness of the material, and the solidity secured in the fitting. Another thing is the wheels do not need to be put in the fire to detach them, as is the case in ordinary wheels. (N.B.—Our wheels cannot be injured by being heated and plunged into cold water, which would render other steel wheels perfectly brittle as glass.) Saving in fuel and wages is evident—no skilled labour being required to refit wheels in case of a strained axle. By adopting this system colliery owners may save hundreds of pounds sterling yearly.

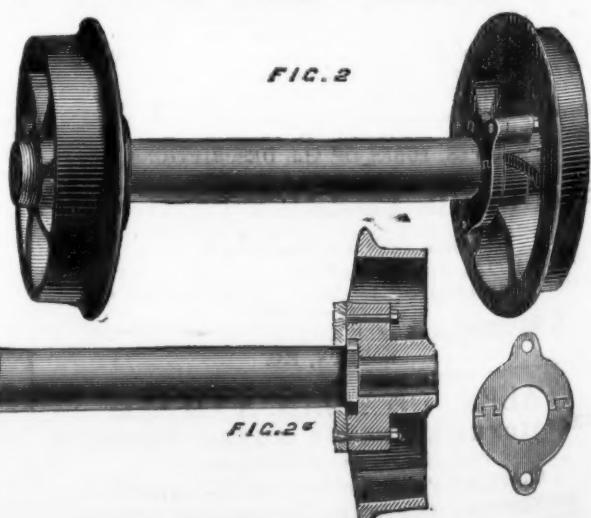


FIG. 2

FIG. 2a

## Original Correspondence.

## SEPARATION OF SULPHUR FROM ITS ORES.

SIR.—I have read with some interest an extract from the Salt Lake Herald, published in the *Mining Journal* of Aug. 10, page 884, in which it is stated that a United States patent has been granted to Mr. Henry Sewell, M.E., for a furnace for the separation of sulphur from its ore. From the imperfect data given it would appear that this process is simply that which is in general use at the present time in Sicily—that the ore is fired in "calcheroni," or large open kilns, in which it is heaped, a portion of the sulphur contained in the ore being burnt to produce the heat necessary to melt out the remainder. A "calcheroni," or kiln, consists merely in a semi-circular wall enclosing one half of the circular floor, which is formed of finely sifted "ginesi," or spent ore, firmly rammed; this floor is made with an inclination of about 1 in 4 or 5. The walls are built of coarse rubble stone, set in plaster made from the gypsum, which is one of the accompanying rocks of the sulphur formation; in some cases even the spent ore itself makes an excellent building material. The diameter of a calcheroni varies from 4 or 5 meters to from 20 to 30, and its capacity is said to be of so many *cassa*. The size of the *cassa*, however, varies considerably in the different districts. In the middle of the wall, corresponding to the lowest part of the floor, a rectangular opening 4 or 5 ft. in height and 1 ft. in width, called "la morte," is left. In loading a calcheroni a number of large stones are heaped up at the "morte" so as to leave a covered passage 4 or 5 ft. in length towards the centre of the kiln; this is called "le porte," and serves as a space for the melted sulphur to collect before being run off. The rectangular opening, or "morte," is then closed with a kiln wall, and the loading of the calcheroni begins—first, by placing the larger lumps of ore on the floor in such a manner as to leave free passage for the melted sulphur towards the "morte," and on this the ore is heaped, care being taken to place the larger lumps in the middle and bottom and the smaller towards the top and outside; in this manner the flow of the sulphur as it melts is not intercepted, as would be the case were no care taken in the loading, and the large and small pieces indiscriminately thrown together.

The ore is heaped up above the top of the floor so as to form a truncated cone, the height of which naturally varies with the diameter of the calcheroni. This cone is covered with fine "ginesi," or spent ore, from former fusions, with the exception of a rectangular space at the back or opposite side to the "morte," and the ore is fired by placing on it a few bundles of dried weeds or straw that has been previously dipped in melted sulphur. After five or six hours, or even more, according to the state of the ore, whether wet or dry, the season of the year, quality of the ore, &c., so as to give the heap time to be well alight, this space is covered with "ginesi," and the calcheroni is left to itself, and requires only occasional attention to prevent any places burning too rapidly and the fire spreading unequally towards the front. The thickness of the covering varies from 2 or 3 in. to as much as 10 in., according to the quality of the ore in fusion, the weather, &c. After eight or ten days the melted sulphur commences to flow to the "morte," and finding it relatively cold it becomes solid, forming the so-called "intavolatura"; this it is necessary to remelt, and for this purpose a hole is made in the thin wall which closes the "morte," and small bunches of straw dipped in melted sulphur are lighted and introduced. In this manner the vacant space becomes heated sufficiently, and the melted sulphur flows readily from the hole into wooden moulds, called "gavite," and on solidifying form cakes, or "batate," of sulphur, weighing about 55 kilos., or (say) 121 lbs. each. Care has to be taken to prevent the internal heat of the calcheroni becoming too low, in which case the melted sulphur fills up the spaces between the stones that form the "porte," and solidifying impedes the flow of the sulphur to the "morte," and in this case the calcheroni is said to be "incanarozato," or stopped, and the sulphur contained in the ore at the back would all be burnt, without being able to run any off. This defect may be remedied by opening the "morte" and removing a portion of the covering at the back of the heap, so as to produce a greater draught, and thereby increase the rate of combustion. In some cases the calcheroni becomes too hot, and water has to be thrown in at the "morte" and more covering put on.

The duration of a fusion depends upon the quality of the ore, and in a great measure upon the size of the calcheroni, but no rule can be laid down. However, generally speaking, a calcheroni containing from 500 to 700 tons of ore requires thirty days from the time it is lighted to that when the last sulphur is run off, and another thirty days before it has cooled down sufficiently to be unloaded. The chief merits of this process are its extreme simplicity and the large quantity of ore that can be treated at once; but at the same time it must be borne in mind that it is extremely wasteful, as a large quantity of sulphur must be burnt to furnish the heat necessary to melt the remainder, and I believe that I am not exaggerating in stating that at least one-half of the sulphur contained in the ore is lost, and is given off into the air, to the detriment of the neighbouring crops, and for this reason the fusion of the sulphur is only permitted after the harvest to the end of December. This is naturally a great drawback to the owners of mines, as they are forced to smelt all the ore raised during the year in four or five months, and a large amount of capital has to remain idle.

There is no doubt that calcheroni, where the ground is favourable and materials close at hand, can be built for \$200 each, or (say) 1000 Italian lire, of a capacity of 200 tons, or even more, and that two men are sufficient to attend to five of them, always provided that they are built close together (these men, of course, do not load them). As a rule, in Sicily, we prefer building them larger, or (say) to hold 700 or 800 tons of ore. In some cases they are far larger, and have been made to contain 7000 tons of ore, but this is an exception, as few mineowners would care to risk so large an amount as the value of 7000 tons of ore in a single calcheroni, but prefer to divide it over several.

That a kiln will last a number of years, as Mr. Sewell's advertisement states, is very certain, and generally speaking, if not totally destroyed by landslips, which are of frequent occurrence in Sicily, they have to be abandoned from the quantities of spent ore which has accumulated round them, making the distance too great for them to be unloaded economically, and it is found more advantageous to build a new one than to increase the price of unloading. They, of course, require occasional repairs, and the floors especially have to be partially or wholly renewed after every four or five fusions.

With regard to the steam process which is referred to in your extract from the Salt Lake Herald, it is in use successfully at some mines in Sicily, but it is said that it is only suited for the treatment of certain classes of ore. Of course a good supply of water must be at hand, and as this is scarce at many mines, this process could not be applied successfully everywhere, and it would be too expensive to carry on at any distance in this country.

The smelting of sulphur in iron retorts, as practised in the Romagna, has never been adopted in Sicily, and it is obvious that with the cost of fuel (coal) in the middle of the island, which may be taken at 70 lire per ton, it would never pay.

The rich ores of Lercara, called *Talamone*, were at one time, and I believe to some extent are so still, melted in open cast-iron pans heated over wood fires; the ore is put in a little at a time and the melting matters ladled out, and when all the sulphur is melted the impurities are allowed to settle at the bottom before ladling off the comparatively pure sulphur into moulds.

If Mr. Sewell's process is no improvement upon that which I have just described, I am afraid that we are no nearer the solution of the problem of separating the sulphur from its ore than we were years ago, and I cannot see clearly how a patent could be granted for a process which is in daily use. At the same time, I wish Mr. Sewell every success in his undertaking, but I am afraid that unless he adopts coal or coke in the place of sulphur as a fuel he will not obtain better results than we are now getting from the common calcheroni. It has been seen that with the calcheroni sulphur itself is the fuel, and whilst at the same time we are using an expensive and low heat-producing fuel, we are burning it in a most uneconomical manner.

I know from experience that the problem is not so easy as it appears at first sight, but we should bear in mind that it is worth trying to solve, and that we can obtain as much heat from 1 ton of good coal as from 4 tons of sulphur, and that if we could hit upon a means of applying it to advantage we ought to utilise as much heat from 1 ton of coal as from 8 tons of sulphur burnt as it is to a disadvantage in the calcheroni.

Palermo, Aug. 17.

A SICILIAN SULPHUR MINER.

## TREATMENT OF COPPER AND SILVER ORES.

SIR.—In the Journal of July 20 there is a letter from M. A. Drouin describing his process for extracting copper and silver from poor ores. From this I gather that M. Drouin claims to be able to utilise ore containing only 1 per cent. of copper. This question is so important to many mines and mining companies which possess immense quantities of poor ores, at present worthless, that I expected to have seen some replies to M. Drouin's statements, but as none have appeared, I venture to ask some of your readers who are well up in this subject to discuss it. Is pyrites attacked in any way by a solution of salt and acid? If M. Drouin is able to extract the copper from pyrites without driving off the sulphur, and with only such "preliminary roasting" as he mentions, I conclude that he claims to be able to decompose pyrites by means of his solution, and to dissolve out the copper from it. M. Drouin also says—"And in a few hours' time the whole of the copper and silver is extracted in the cold, no heat being necessary." Is silver soluble in a cold solution of salt and sulphuric acid? And lastly, M. Drouin says—"The scrap iron used is about 75 per cent. of the copper produced." It has been my experience that with a nearly neutral solution, about 75 per cent. of iron is required, but that with a slightly acid solution the consumption of iron is increased, so that it seems to me that with a strong acid solution, such as M. Drouin's process seems to require, the proportion of iron would be considerably over cent. per cent. If M. Drouin's process would do what he claims for it it would be an immense benefit to very many mines, but such statements as these, if incorrect and allowed to go uncontradicted, may do a great deal of harm by inducing mines which can ill afford to waste any capital to spend money on experiments which will be entirely thrown away.—St. Clements House, Aug. 20.

C. E.

## RICHMOND MINING COMPANY.

SIR.—In last week's Journal Mr. Elliott writes that my letter, which appeared in the Journal of Aug. 10, contained "serious inaccuracies, which it is important to correct, and erroneous conclusions it is essential to refute." I am most willing to be corrected if I have erred in my statements, and to withdraw any mistaken conclusions. I leave this matter to the judgment of the general body of shareholders after they have read my letter, and the one by Mr. Elliott. I can assure Mr. Elliott that I looked very carefully through the official file of Richmond reports and circulars to see if there was a circular to the shareholders previous to the directors' report of Nov. 18, 1873, which in any way alluded to the creation, &c., of the Nevada Company. I could not find any, and I judge from the wording of the directors' report that no such circular as Mr. Elliott mentions was issued to the shareholders. The paragraph in that report was as follows:—"During the progress of the suit, counsel advised that for the better protection of the company's interests it was imperatively necessary to incorporate the company in the United States of America, in conformity with the laws of the State of Nevada; this was accordingly done in the name of the Richmond Mining Company of Nevada."

Mr. Elliott states that Mr. Streeter, a barrister, and one of the first directors of the company, was sent out to examine the property, and to see that the title was good, and the patent to the property was obtained before the transfer was completed. He lays the blame of accepting the property from the vendors without the patent on Mr. Streeter, but surely Mr. Elliott and the other directors are equally to blame for purchasing a property in Nevada, even with the United States patent to it, which they could not control or work directly themselves, because the laws of that State did not allow aliens to hold, work, and inherit property therein. This fact, in regard to aliens, was well known in 1871, when they purchased the property, as in 1873; and it is most strange that under such circumstances the vendors were successful in selling the property in London for so large a sum. Mr. Elliott then relates how the property was deeded over to Prof. Fisher, who was the first manager and sole agent of the English company, and how Prof. Fisher subsequently betrayed his trust, and had to be paid 2000/ to induce him to surrender the property to Mr. King.

Although I knew of this fact, I did not quote it in my letter as I might have done, to give additional significance to those editorial statements in the Eureka Sentinel of June 27, as to Mr. Probert's legal ability to "retain possession of the property." As Mr. Probert knew that the Eureka Sentinel is regularly forwarded to the London office, where it is read by the directors, the company's solicitor, and by several of the more cautious shareholders, it is most extraordinary that he has never repudiated those ugly statements. Mr. Elliott clearly admits that the Nevada Company, through its officers, has absolute control over the property, and that the directors of the English company have no control except as representing 10,995 shares out of the 11,000 shares which constitute the capital stock of the Nevada Company. Mr. Elliott, however, is clearly wrong in stating that the English company is at present "endowed with a power which for all practical purposes is ample and absolute," because he of all others must know that the directors have given Mr. Probert their proxy for the 10,995 shares, which power is as good as any power of attorney, as Mr. Probert holds it all the time, and can use it at any time to call a meeting of the shareholders of the Nevada Company, and he and the other two trustees can amend the by-laws of that company, and do anything else they please without the directors of the English company ever knowing that any meeting had been called, or what business had been transacted. I am sure that the general body of English shareholders are ignorant of this fact, especially as it is entirely contrary to the usual way of conducting business in this country. Whoever thinks of giving the directors of the English company his power of proxy for them to use all the time, or on any special occasion, without being consulted or kept informed as to the business for which it is used? Mr. Elliott states that the "English board having implicit faith in Mr. Probert's integrity, considered such an arrangement entirely satisfactory." Surely this is mere sentiment, and not business. For the same reason the shareholders might say "We do not require a board of directors simply to accept and endorse all that Mr. Probert initiates and directs; we can employ a clerk on 100/- a year to do that." When Mr. Probert in his evidence states that he is only a subordinate to the president of the Nevada Company, and that every act of his must be submitted to the president, consequently the interests of the English shareholders are virtually centred in the president of the Nevada Company, and who has stated that "it would not be a breach of trust if the property were not conveyed to the English company at their request."

Mr. Elliott says, in reference to this most extraordinary evidence of Messrs. Probert and Wren, that "the answers obtained must be taken as the technical legal definitions of its (the Nevada Company's) position. I really cannot follow Mr. Elliott in this. What is absolutely false cannot be true. Messrs. Probert and Wren swore to what the Court believed on their evidence to be the facts, because the Court rendered its decision on Feb. 9, 1877, which non-suited the Eureka Company. The Court decided that the Nevada Company was not a myth; that the English company was not in possession of the property; that Mr. Rickard had not taken possession of the property in the name of the English company; and that at the time of commencing the suit, and also at the date of this decision, the Nevada Company was in possession of the property.

The facts are that the board assigned the property to Prof. Fisher in 1872; he assigned it to Mr. King, who assigned it to the Nevada Company on its creation in 1873, which company reassigned it to the board on Feb. 29, 1876, and then the board on Feb. 20, 1877, re-conveyed it to the Nevada Company, so that from Feb. 29, 1876, to Feb. 20, 1877, the English company was in actual possession and

absolute control of the property. The suit of the Eureka Company against the English company was commenced on Feb. 1, 1877. On the 7th Mr. Probert gave his evidence, and on the 9th, and after the Court had rendered its decision, he cabled to the board to reconvey the property immediately to the Nevada Company, but he did not inform the board that he had already testified that the English company did not own or control the property in Eureka.

The course pursued by Messrs. Probert and Wren in thus upsetting the Eureka Company's proceedings against the English company was clearly a very dangerous one for themselves, and, as it turned out, a very disastrous one for the English company. The delay of six months, caused by this action, enabled the Eureka Company to more fully develop their big lode theory, and to make (what Mr. Probert states he always feared) an ore connection between their Margaret patented ground and the Pott's chamber, which they could not have done had the original proceedings been allowed to stand. What could the English company have suffered had the original suit been continued? The property had been entirely mortgaged to the English debenture holders in 1876, and the mortgage deed had been properly recorded in Eureka. The following is what Mr. Elliott told the shareholders at the adjourned meeting held on Aug. 23, 1877:—"You may recollect that at the time it was necessary to raise money by debentures that the whole of the property was deeded over to Mr. Hopkins and myself as trustees for the debenture holders. We, therefore, hold in your interests a mortgage over the whole of the assets of the company; and, in fact, over the whole of the property. It may or may not be necessary to put that power in force."

This being so, why did the board reconvey the property to the Nevada Company? Mr. Probert was himself one of the debenture holders, and knew that the \$30,000 had been raised by these debentures for a working capital, and yet he gave evidence that he did not know that the money or the property of the English company paid the working expenses at Eureka. When I was in Eureka in 1877 I heard Mr. Wren and others say that Judge Cole, who heard the first suit in February, 1877, would have decided against the contention of the Eureka Company on the evidence given in the subsequent suit.

I think the shareholders should ask Mr. Elliott how it was that the board, under his *regime*, never directed the managers at Eureka to obtain an Act of the Nevada Legislature to enable aliens to hold and inherit property in that State. This was clearly the common-sense and business-like course to have pursued when it was known that aliens could not control and work the property in Nevada. I am quite sure that such an Act could have been obtained when the Legislature met in 1874, and again in 1876. I have heard Judge Wren and leading men connected with mining interests in Nevada say that such an Act could be easily passed. In 1872 I was interested with Mr. Ralston and others in the purchase, irrigation, and general improvement of an extensive tract of country in the State of California. We required the assistance of English capital, and to enable this to be done with proper security to the English investors it was found necessary to obtain from the State Legislature an Act enabling aliens, resident and non-resident, to hold and inherit property in that State. This Act was accordingly obtained, and came into force on Jan. 1, 1873. The same freedom is granted to aliens in Colorado, Oregon, and Utah, and in a few other States in the Union.

The Plumas Eureka, the Sierra Buttes, and other English mining properties in California do not require the intervention of an American Company. It is clearly to the interests of those owning mining properties in the State of Nevada that English capital be safely invested, and under English control in that State, and I cannot conceive of any active and effective opposition being offered to the passage of such an Act by the Legislature. After an experience of eight years on the Pacific Coast I am satisfied that English companies and individual capitalists have greatly erred, and shown a want of due business caution in their first purchase and management of property in the States. Their agents have too often allowed themselves to be led blindly along by the vendors and their agents. Had Mr. Streeter gone in the first instance to such professional gentlemen as Mr. J. D. Hague, or Mr. Wm. Ashburner, or Mr. A. Bowie, of San Francisco, for advice and general assistance in securing the property, he would never have been so foolish as to have accepted the property under the conditions then offered. The gentlemen I have named I know of my own knowledge to be thoroughly competent, painstaking, and honest, and intimately acquainted with the mining properties, pursuits, and requirements on the Pacific Coast.

"A Retiring Shareholder" remarks on my having sold my shares. I sold my shares on July 17, before I had seen the Eureka Sentinel of June 27 last, and before that paper had reached London. I did so on information I had received from a source in Eureka, which I deemed reliable, that the Richmond bonanza was nearly exhausted, and that unless new ore bodies were developed there would not be enough ore to keep the three furnaces running over this month, that the furnaces needed repairs, and would be shut down very soon, that Mr. Rickard was no longer a free agent, and that the committee's report, with their recommendations, were considered by the management there as *ultra vires*. I am quite sure that no shareholder who had paid, as I had, 12/- 10s. for his shares would have held them on what he knew must be, sooner or later, a falling market.

Before publishing my letter I took care to communicate the facts to the members of the late committee, three of whom are directors, and to Mr. Vallance.—Aug. 21.

R. M. BRERETON.

## RICHMOND CONSOLIDATED MINING COMPANY.

TO THE SHAREHOLDERS.

SIRS.—Since the publication of Mr. Brereton's alarming letter in the *Mining Journal* and *Mining World* of Aug. 10, I have received numerous letters and calls from shareholders, some asking me to say if the facts are really as stated in Mr. Brereton's letter, and others asking if I would advise them to sell their shares; others enquiring if I would recommend them to buy; some write saying they recently purchased shares at 12/- 10s. on representations that they were worth 25/-, and cannot understand why they should so soon after drop to 8/-; others ask me point-blank if I consider "those we have set in authority over us are honest men or rogues." It is impossible for me to reply separately to all these enquiries, but it is due to those who have written for information, and also to the many shareholders who entrusted me with their proxies for the late meetings, that they should be informed of the efforts I have made to induce the directors to clear up the atmosphere of doubt which now unfortunately exists as to whether the English shareholders really have a mining property or not. Shortly after Mr. Brereton made the discovery as to Mr. Probert's evidence in the Eureka suit he showed me the notes, and said he considered it was his duty to state the facts in a letter to the shareholders. I strongly advised him against the adoption of such a course, urging him in the first instance to communicate the facts to the directors, and see what reply they could give. A fortnight having elapsed, I thought Mr. Brereton had acted upon my advice, but on finding his letter in the *Mining Journal* of the 10th inst., I considered it my duty to communicate with the board; and, as will be seen from the annexed correspondence, the board do not feel in a position to make any reply.

The correspondence with the directors will repay a very careful perusal. Nothing could appear more satisfactory than the secretary's letter to me, dated Aug. 13, and nothing more unsatisfactory than his next letter, dated Aug. 15, for it appears there is always some reason found for withholding information, and for keeping shareholders "groping in the dark" when it is desirable they should have a few rays of light, to show them clearly the position of their affairs. Since the receipt of the secretary's last letter I have been engaged trying to "bottom" this business. The result is, there is no doubt whatever, that at the present time neither the London board nor English shareholders have the slightest legal power or control over what we have hitherto considered as our property, and as matters now stand, if unfortunately any difference should arise between the London company and the trustees of the Nevada company, the London company and English shareholders will be found absolutely powerless, and must inevitably "go to the wall," for we are bound hand and foot. All our property is absolutely in the hands of Mr. Probert and two others acting with him as trustees of the Nevada company, and their power to work good or evil is limited only by their own will. This undesirable state of affairs can only be altered by the London company getting back as soon as they can a reconveyance of the property from the trustees of the Nevada company. I find that long ago the company's eminent counsel, Mr. Benjamin, Q.C., advised the directors to get an Act from the Legislature of Nevada, the effect of which would have been to place the property for all time under the control of the English shareholders, instead of leaving it, as it is at this moment, in the absolute control of three American citizens. Why was not this sage advice and prudent counsel adopted? The directors, who failed to act upon this advice, may yet have to account to shareholders for the neglect. Be this as it may, until this legislative Act is obtained it is a perfect farce to have meetings of English shareholders to vote on questions of reform in the administration at Nevada, when those in charge of that administration can, if so disposed, set our deliberations and those in session at defiance; and this, I am convinced, they have at the present time



and honesty were left out of the question. It is this class of transaction that must be avoided in connection with Cyprus, for the fact must not be ignored that, although in this particular case no business was done, it was only a small percentage of the purchase-money paid by the public which left this country in the case of the Emma, Flagstaff, Ruby, Exchequer, and the various other Anglo-American concerns which are, or have been, on the English market.

But it must not be supposed that the promoters pocket these differences, for frequently these receive but a small commission, considering the dirty work they have to do, and the obloquy heaped upon them. A large proportion of the difference is distributed among the directors either in the form of payments for qualifying presents, or in some other way, so as to evade the law, and thus avoid punishment for conspiracy or fraud. If this principle be abolished in connection with Cyprus undertakings, there will be no difficulty in raising funds and in realising profits from the working of the mines.

That the attractions and capabilities of Cyprus have been much exaggerated I admit; but, on the other hand, there are not the difficulties to be encountered which the enemies of the island have mentioned. There is a very good port on the north side of the island, and although Famagusta is at present in a very dilapidated condition as regards harbour accommodation, the restoration of the old pier and the construction of a good breakwater would give an excellent harbour. With regard to the mines I do not anticipate that they will ever turn out sufficient mineral to injure the market, as the Chilian copper mines and the Australian tin mines have done, but there is an abundant field for remunerative enterprise. Near Bapho, for example, there are excellent copper deposits, and if asbestos be a mineral that can readily be sold it can also be obtained in large quantities and of splendid quality in the same locality. Amber and copper can also be obtained near Larnaca, and I should think that all minerals could be cheaply carried to England in the cotton ships, as they are carried in the wool ships from Australia. The Cyprus cotton is of good quality from American seed, and tobacco and madder are also produced, but the trade in these could be largely developed. The salt lakes are large and lucrative, but are Government property, the salt trade being a State monopoly.—*Lemnos, Aug. 4.*

## CORNUBIENSIS.

## RECENT ORIGIN OF MINERAL LODES AND DEPOSITS OF METALLIC MINERALS.

SIR.—We have seen attempts to account for the formation of mineral lodes by supposing them to have been originally cracks in the rock, produced by the general cooling of the earth, and consequent contraction thereof;—these lines, or fissures, splitting up the earth into wedge-like pieces, enabling its crust to contract upon an ever-diminishing nucleus, and afterwards becoming filled with metallic minerals, in some way or other not easily understood. Now, without any intention of arguing about the older fissures, I have thought that the formation of mineral lodes and irregular deposits of metallic minerals may partly be due to the expansion of the surrounding rocks. In looking over any mining district where there are veins or deposits of metallic minerals we find the contour of the surface is always the result of denudation. This denudation has at some distant period gone on, perhaps, for countless ages, until in some cases miles upon miles of solid rocks, formerly resting upon the present surfaces, have been removed. Now, the rocks we see before us to-day, having been at some former time at great depths—consequently, under great pressure—having been gradually relieved from that pressure, and the greater heat consequent thereon, have as gradually expanded and cooled on rising nearer the surface as the destruction of the superincumbent rocks proceeded.

This gradual expansion would open many old fissures, and perhaps produce many cracks and cavities more—the widening of which might, of course, be very slow. Through these fissures and into these cavities the excessively hot water and, perhaps, gasses, hitherto pent-up at great depths, would percolate. These excessive hot waters and gasses would contain many minerals in solution, and rapidly losing their intense heat, being thereby unable long to retain these minerals in solution would deposit them in the fissures and cavities—thus forming mineral lodes and deposits.

If this view be correct, then it follows that the lodes of metallic minerals and mineral deposits generally have been formed quite recently, when compared to the ages of the rocks in which they are contained—and I think this can be shown to be so. In looking for the finest and most perfect mineral crystals experience teaches us to look within a moderate depth from the surface, where the rocks have had room to expand, leaving cavities where such crystals can grow, which we do not so generally find as we descend into the deeper mines. Now, the difference between our shallowest and deepest mines is as nothing when compared to the vast depth of rock which has in some cases been removed by countless ages of denudation from the top of our metallic mines. Hence, had the metallic minerals been deposited while the rocks were under this pressure we should not have found any appreciable difference between the crystals near the surface and from greater depths.

It is clear that the mineral crystals generally adorning our cabinets have not been developed under great pressure, neither have they been subjected to great pressure since their first birth in their present form. It is equally clear that the rocks which surrounded these crystals, and in which they grew, bear evidence of having sustained at some period very great pressure indeed—hence the metallic minerals have been deposited in their present positions since that pressure has been removed.

The disruptions of the rocks arising from expansion might be expected to conform more or less with the strike of the lavas and other eruptive rocks which had penetrated the strata, while under pressure, as there might be expected, conditions favouring fresh disruptions along the line of these penetrating rocks. Accordingly we find that in many instances the mineral lodes actually conform for considerable distances with the strike of the lavas and greenstones in most of the mining districts.

These views would not be favourable to the majority of mineral lodes continuing largely productive to very remarkable depths—for disruptions from expansion would not be generally broader at great depths than nearer the surface, where the expansion of the rocks would be greater. Except in those instances where the disruptions had branched off from one opening into two or more, and sometimes many on approaching the surface. In such cases, after the openings had been filled with mineral, the branches would appear to an observer approaching or exploring them from the surface as converging in depth, and the lode would appear to increase in breadth at every point of convergence, or rather at every junction—consequently becoming larger and more productive as it went down. This would be the case until the last of the converging branches had been passed, when a contraction, sometimes gradual and at other times very rapid, would ensue. I believe that this has been the experience of most observers of mineral lodes with regard to many of those lodes, and probably would be with many more of them on their being a little further explored; and, this being so, we must not look for productive mines down in those sub-lime depths which some people have been preaching of late. Although some of our mines are richly productive to (say) nearly 400 fms., and may go down all right further still, even they must become unbottomed at no very great depth if our theory be correct; and to talk of a richer zone below of 500 fms. after the top 500 fms. shall have become exhausted, if not moonshine, appears more likely to end in vision and a dream than ever to become sober reality.

Now that mining enterprise has been kept for so long a time in abeyance, consequent on the bad state of trade, over production of the metals, &c., many lessons have been learnt, improvements introduced, abuses swept away, inferior mines succumbed, and the deeper mines are being rapidly scooped out in order to keep up the steam necessary for keeping them going. Trade is not likely always to remain in a bad state, and over-production of the metals always works its own cure from the rapid exhaustion of the over-producing mines. Hence all these things tend towards a violent reaction, and on a general improvement in trade metallic mining is sure once more to come to the front with its wonted elasticity. Let us, then, when that time arrives guard against buying gold too dear—against

sinking money in mines already too deep to give any return. Let us leave the deeper zones alone for speculative study to those who choose to speculate on what may be, without being likely to go down there themselves to see what is. We shall find mineral ground enough sufficiently fruitful within a moderate depth below the surface of the earth to supply the requirements of the world without incurring greater risks in searching for the metals than can be more than counterbalanced by the profit of their production.

To secure this we must economically keep to all the improvements introduced in working, and that can be introduced—but of infinitely greater importance is judicious selection. If the views put forth in this paper be correct that deposits of metallic minerals as we now find them are of recent origin, and for the reasons here assigned, then on their general acceptance the chances of unsuccessful mining operations become fewer, as we cast off all notions of taking up old deep and expensive mines for resuscitation. This discarding of old deep mines is no new thought, for similar views have been advocated before; but always, so far as I have seen, without any sufficient reason being assigned for such views. Without sufficient reasons being advanced against a particular course you will find that course to be often pursued by men who, although open to sound argument, are deadly opposed to receiving dogmatic assertion. Such men may on very fair apparent grounds be sometimes led to follow a course which under clearer light they would not have chosen.

I have given you some of my reasons for believing that metallic deposits as well as lodes as we now find them are of recent origin. If my views are correct we are then on the track of learning something more about them; and, if my views are not correct, I trust that some of your many able correspondents will show me their fallacy.—*Redruth, Aug. 21.*

WM. TREGAY.

## ROCK-BORING MACHINERY—SCHRAM'S DRILL.

SIR.—As "Delta" did not care to respond to my invitation in your issue of Aug. 10 to give his real name, allow me through the medium of your valuable Journal to prove the incorrectness of the statements made in his attack upon me in the *Minning Journal* of Aug. 3. Mr. "Delta" must excuse me if in the following remarks I only refer to him as Mr. D., as when I write in English I like to employ English terms. After writing my provisional specification I learnt that Mr. Crease had formerly taken out a patent for a rock-drill on the direct-acting system, and when I wrote my final specification I mentioned this fact and only claimed the construction of a machine as I have constructed it, not as Mr. Crease has it, because a machine made after his drawing would not work. That is, I claimed the construction of a machine which in the course of many practical experiments, had found to be of real value. Having afterwards found that there was another rock drill on the direct-acting system constructed by Mr. Edwards, I bought his patent because his idea of an automatic feed was good. However, Mr. Edwards' machine did not work properly, the recoil of the slide-piston preventing the proper opening and closing of the slide, and as my construction has beyond doubt proved itself to be the best, I prefer to retain it. Mr. D. says "the Schram ore-compressor direct-acting was made in England nearly 30 years ago, and somewhat extensively employed as an exhaust-pump at Millwall." Whether a construction somewhat similar to my air-compressor was used 30 years ago as an exhaust-pump I do not know, but will take Mr. D.'s word for it; however, my air compressor is not an exhaust-pump. If, as Mr. D. says, it has been "somewhat extensively employed," this only proves that the idea must be good which practical trials lately made with my air-compressor at the works of Messrs. Oliver and Co. (Limited), of Chesterfield, have also proved. However, when Mr. D. wrote his criticising letter he had never seen any of my air-compressors, and knew nothing about the details of my construction.

If one were to criticise any steam-engine or pump in the same spirit as Mr. D. criticises my construction one may as well at once say James Watt is the constructor of them all, as he was the first to use a steam-cylinder and a double-acting piston. But as such an argument would be absurd to any fair-thinking mind I shall go on making all the improvements I possibly can, as they may prove good to the public at large.

Zwick's work on "Tunnelling," to which Mr. D. refers, I have not been able to find either in the British Museum or in other libraries where I have enquired for it. However, the construction of my carriage support is the result of many years' practical experience in tunnelling and level driving. Numerous are the constructions I have made, and many of them have been practically carried out, and all the improvements I have made in this kind of support have gradually led to the one described in "The Application of Machine Power in Rock Drilling."

It is possible that Mr. Darlington has tried a support for shaft sinking, in which the principle has been similar to the one, for certain cases, constructed by me; but although I have never had an opportunity of seeing his support, I very much doubt that the construction is the same, as this would be a very remarkable coincidence.

In his very great desire to find fault with a machine which, to judge from his false remarks, he has very likely never seen at work, Mr. D. very much contradicts himself. He says "the blows must frequently strike the back cover and front gland, particularly if the pressure fluid should be high—a trick disagreeably bad and dangerous." And again, "the result is a feeble, vacillating, or a kind of sham blow." If the machine gives merely a "sham blow," what fear is there of the piston striking the back cover or front gland? In paragraph 2 he admits that "the air is not worked expansively," consequently there is full pressure on the back of the piston; but in paragraph 3 he says "there is no pressure whatever on the back of the piston." Every engineer will at once see the worthlessness of these contradictory statements.

But let us now see if there is any truth whatever in Mr. D.'s assertions, which it will seem Mr. D. has found applicable to Crease's machine.

"1.—The piston will and must frequently strike the back cover and front gland, particularly if the pressure fluid should be high—a trick disagreeably bad and dangerous."

In the Dalkarlsberg Mine, in Sweden, my machine was introduced for the purpose of driving a heading in a place where, in consequence of the hardness of the rock, the work had been abandoned by the hand labourer, and for several fathoms from the face the roof had been kept lower and lower, so that when the work with my machine commenced all the holes had to be directed upwards in the roof, in order to give proper height for the carriage support, which, by the way, was of a different construction to the one described in my pamphlet. During the whole of this operation, when all the holes were directed considerably more upwards than is necessary in ordinary level driving, the piston never struck the back cover. In consequence of the great force of each forward stroke the piston would naturally strike the front gland were the machine put in the hands of careless or malicious workmen, who did not feel the machine so as to allow the drill point to strike against the rock; but I have provided even for these cases (see the "Application of Machine-Power in Rock Drilling," p. 12), and unlike most other rock-drills I have (besides the air cushion formed between the lower inlet and the front gland) a wrought iron ring and an india-rubber washer to diminish the force of the blow. As one among many witnesses to the truth of what I have here stated, I may mention Mr. Gustaf Bratt, Managing Director of the Dalkarlsberg Mines.

"2.—The air is not worked expansively, consequently the consumption of compressed air must be at least the cubic contents of a stroke multiplied by the number of strokes made per minute. Its remarkably small consumption of air or steam is, therefore, a bare assertion, and not a bare fact."

This sounds very fine, but proves how very little Mr. D. knows or understands my machine. The stroke is a short though powerful one, because the piston works perfectly freely, and the motive fluid is utilised to its fullest extent. How I arrange my ports I do not care to instruct Mr. D. The fact is that I, through many carefully made experiments, have found the right position for the

ports, so as to reverse the slide at the right moment without any waste of motive fluid. In Levant du Flenu, by Mons, in Belgium, the following experiment, suggested by me, was made to find out the real consumption of compressed air by different rock-drills.

An air-receiver was filled with compressed air at  $3\frac{1}{2}$  atmospheres pressure, and the connection with the air-compressor being shut off holes (all of the same diameter) were bored with different machines (the air-receiver always filled to the same pressure before each new machine was started), allowing the pressure to sink till the machines could bore no more, when the holes were measured. The Duboiset Franje and the Dunn machines bored 1:20 metre and 1:30 metre respectively, and the Schram 4 metres. Among others, Mr. Charles Viliot, engineer to the Société de la Meuse, in Liège, and Mr. Mativa, engineer to the Société Levant du Flenu, were present.

In the Magpie Level, near Ashford, in Derbyshire, an Ingersoll rock-drill had been tried, and the air-compressor (driven by a turbine) could hardly keep it going; but the same air-compressor proved sufficient to drive two of my large machines simultaneously. These are facts which I am prepared to prove, and which speak more than Mr. D.'s "bare assertion."

"3.—The blow is obtained where there is no pressure whatever on the back of the piston, and when the full pressure is on the front of the piston to withdraw the tool. The result is, in spite of Mr. Schram's assertion a 'betwixt wind and water,' or a kind of sham blow."

Again Mr. D. proves his very great ignorance of the subject on which he is so very desirous to enlighten the public. Among the many proofs of the powerful blows of my machine it may be sufficient to give the following return by Mr. G. Bratt, member of the committee appointed by the Swedish Iron Institute (Jern Kontoret) to report on trials with the best existing rock-drills.

The trial took place in the gallery Vikern, in the iron mine Dalkarlsberg, Sweden. The rock was exceedingly hard corit.

Machine.	35 lbs. pressure.			45 lbs. pressure.			55 lbs. pressure.		
	Time.	Feet.	Lin. p.m.	Time.	Feet.	Lin. p.m.	Time.	Feet.	Lin. p.m.
Schram, wet.	22 50	3:29	14. 5	10 15	2:00	29:30	14 40	4 85	33:06
dry.	39 24	3:06	7. 7	20 30	2:06	11. 0	—	—	—
Band, wet.	23 15	2:00	12. 4	24 0	4:02	16. 75	13 30	3 61	27. 0
dry.	39 40	2:23	5.62	23 30	2:19	9.32	—	—	—
Ingersoll, wet	17 0	1:35	8. 0	21 35	3:25	15:09	14 50	2 88	19:20
dry	—	—	—	22 35	2:24	6.90	—	—	—
Burleigh, wet	Did	not work.	Worked badly	21 20	2:45	—	21 20	2:45	11:48

1 Swedish foot = 10 in.; 1 in. = 10 linen.

Here is an extract from a letter from Mr. Jahn, dated Müllerschacht, Liebau, Aug. 8, 1876, which I give in English:—

Fifth trial, Aug. 8, in rough sandstone. Schram's machine, No. 4\*. First hole horizontal; dry; in 35 minutes, 45 $\frac{1}{2}$  in.; changing of drills, 5 $\frac{1}{2}$  minutes; time for actual boring, 29 $\frac{1}{2}$  minutes. Per minute ... ... ... ... ... ... ... ... ... ... 1:63

Second hole horizontal; dry; in 41 minutes, 46 in.; changing of drills, 6 $\frac{1}{2}$  minutes; time of boring, 34 $\frac{1}{2}$  minutes. Per minute ... ... ... ... ... ... ... ... ... ... 1:34

Third hole 5° upwards; dry; in 41 minutes, 53 in.; changing of drills, 5 minutes; time of boring, 36 minutes. Per minute ... ... ... ... ... ... ... ... ... ... 1:47

Darlington's Machine: First and last hole 30° upward; dry; in 1 hour 48 $\frac{1}{2}$  minutes, 50 in.; changing of drills, 13 $\frac{1}{2}$  minutes; time of actual boring, 95 minutes. Per minute ... ... ... ... ... ... ... ... ... ... 0:5 JAHN, Betriebsleiter.

In both these cases the machines worked under the same conditions, in the same rock, and with the same pressure.

If Mr. D. requires any more proofs of how very wrong he has been in his statements I am quite prepared to furnish them. With regard to Mr. Mahler, of Vienna, Mr. D. says—"Indeed, between these two gentlemen there would seem to be some understanding to praise and promote each other's interests." I think Mr. M. has a right to prefer my machines after satisfying himself that they are the best, particularly as these machines, after severe trials, have been adopted at the well-known mines at Pribram, in Bohemia, belonging to the Austrian Government, and elsewhere. As for myself, I have till now never, in print even, as much as mentioned Mr. M.'s name.

With regard to Mr. D.'s remark that some of my illustrations are to be found in a tract by Mr. Mahler, it is natural that in Mr. M.'s description of my machine there should, as a matter of course, be some resemblance, since it was I who furnished him with the drawings of the machine; but all my illustrations are photo-lithographed from original drawings made by myself. Thus, even his remark on this point does not do Mr. D. any credit whatever.

Having now stated a few of the facts I have at my disposal, I leave it to the right-minded English public to judge between me and Mr. D.—London, Aug. 21.

RICHARD SCHRAM.

\* No. 4 was the number of the machine, which was of the smallest size.

[Mr. Schram has shown us the several letters referred to in proof of the accuracy of his translation of them.]

## SCHRAM'S CLAIMS.

SIR.—My attention has been called to certain inventions claimed by Mr. Richard Schram. The air compressor which he distinguishes with his name

hours' pumping per day will keep the water under, one engine would suffice for both winding and pumping. The apparatus can be worked by a winding-engine fitted with a drum, by a locomotive engine on a railway by a jack roll, or by any power where the rope or chain can be applied. It may be applied in any place where water is required to be lifted in factories or other works. If required in factories it may be used as a hydraulic power, or it may be used as a hydraulic power in mines or pits by attaching a cock or valve to the cylinder, and applying a pipe to the same. This apparatus is applied with facility, and readily repaired; when the bucket requires repairing it is drawn out of the cylinder, when if the clack is tight the column of water will be maintained. The clack can also be drawn up out of the cylinder, or it may be examined at a door which is provided in order to afford ready access to it. Straps or bridles are provided for the purpose of controlling the lift of the valve. In the case of a mine or pit being filled with water, the cylinder can be lowered into any depth, as required; if lowered to the bottom of the shaft, the full length of the shaft can be lifted at one stroke. The cylinders may be made of any size to suit the quantity of water required to be lifted.

By applying two or more cylinders, which may be worked by a stationary engine with drum and spur gear, or otherwise, one bucket will be ascending while the other is descending, whereby a constant flow may be kept up; when once the column of water is formed the stroke may be made of any required length, according to the quantity of water required to be lifted. It is preferred to employ a ball clack; the seat of the clack is formed with openings or gratings to allow the water or other liquid to flow through, and is concave, of the same radius as the ball; the ball is spherical, and may be made of india-rubber or any suitable material; the seat may also be faced with india-rubber or other suitable material to relieve the shock upon the ball falling upon the seat; by this arrangement the ball is not so liable to get out of order as is the case where it falls upon a mitred edge; this arrangement of ball valve and seat is also applicable to the bucket, and also generally wherever a bucket or clack is required. The joint of the cylinder or pipe is formed with a spigot and fawcett with the inner edge of the fawcett chamfered off, the joint being made water-tight by placing a small ring of india-rubber or other material over the spigot, and the two lengths secured by bolts and nuts. It will thus be seen that the pump is entirely novel and very simple, so that if it works as the inventor anticipates it cannot fail to be very economic. **MECHANIC.**

Aug. 19.

#### PATELEY BRIDGE MINES.

SIR.—Capt. Williams, of the Van, inspected the above for us in April, 1877. He then directed certain works to be undertaken so that the success of the company might be assured, but I do not see that anything of the sort has been done, so we are in no better position now than we were then. Thus time and money have both been lost. Now, however, that a discovery has been made worth 10 tons of lead per fathom, and the mine proved to be all that was expected, I trust the direction will at once carry out the suggestions of Capt. Williams, and not lose the present opportunity. What Captain Williams recommended was identical with the course advocated by our esteemed director, Mr. George Batters—proving the course of ore in the 30 fm. level, and draining the mine by a cross-cut from the Eagle level, which would unwater all the workings to a depth of between 30 and 50 fms., and make Pateley Bridge one of the most profitable mines in Yorkshire. To provide the funds for this object it would be necessary to create and issue another 1000 shares—5000L. The capital would then be only 25,000L; at present it is 20,000L. My impression is that the result of the expenditure of this amount would be works unrivalled for economy and efficiency.

Among many good mines brought out by Mr. Batters, Van and West Chiverton being conspicuous, Pateley Bridge will, I feel certain, not rank least, and I think success will be secured by adopting the recommendations of Capt. Williams, above referred to (I quote from his report):—"It seems to me that you will never make a mine of it unless you sink an engine-shaft from surface, and where should it be sunk so as to be most serviceable and command the whole mine with its several lodes? A level called the Eagle level has been driven towards your eastern boundary, in which they encountered a very strong stream of water, sufficient to drive a water-wheel. It is believed that this level drains the Sun vein, which to a certain extent has been proved, because the shaft on Sun vein near the end of the level was sunk dry 30 fms. below that level, and it was the want of sufficient ventilation to keep their candles alight that forced them to abandon it. If (as before stated) the present trials prove satisfactorily that the lode is productive below water-level, I should say sink your shaft from surface, and drop upon the shaft already sunk 30 fms. deep on Sun vein. This done, you can drive east on the Sun vein, and by crossing south intersect, prove, and drain all the principal lodes in the sett, as from the Sun vein the water would probably drain into the Eagle level, which I understand is about 60 fathoms deeper than Sun vein level, or 30 fathoms deeper than bottom of shaft. If these trials which you are now prosecuting turn out so successful as to guarantee the sinking of the shaft, you will by developing the mine in the manner herein described open out as fine a mine as any in England, as you would then be in a position to open it up on a very large scale, having overcome the great hindrance of water."

With success obtained, my shares, now worth 5L, which I consider simply nothing, would stand at many times that amount. My idea is that we must have the benefit of Mr. Batters' practical experience, and I wish to impress this upon my co-shareholders. I am also desirous to draw public attention to the remarks of Messrs. Watson Brothers in your last two issues. I am quite willing to take my *pro rata* interest in the new issue of 1000 shares, provided this work is to be carried out as recommended, and that the present fine discovery is not thrown away. **AN ORIGINAL SHAREHOLDER.**

London, Aug. 20.

#### MINING IN NORTH WALES.

SIR.—I have before alluded in your valuable Journal to the great extent of undeveloped yet highly mineralised, though unwrought, ground both in the mountain limestone and the millstone grit. There are, however, strong indications of a favourable reaction, and I hope ere long to have the pleasure of recording the resuscitation of several highly promising, though for a time dormant, concerns. It is, however, necessary, in the face of this reviving activity, to select undertakings possessing the true elements of success, while discountenancing spurious and reckless speculation. There has been a happy blending of three well-known mines under one banner as a limited company—the Belgrave, Black Mountain, and East Pant-dū—and probably for promise and substantial prospective results enterprises of greater merits could scarcely be selected throughout the whole district.

Belgrave is well worthy of a spirited resuscitation, and a glance at the section of former workings in the possession of Capt. Roberts will give some idea of the mass of ore ground gone down, and the productive stoping ground existing, and only awaiting development in depth. There is much important information to be gathered from old miners, as well as a study of the rock formation and the characteristics of the lodes embedded therein. Having regard to all these, and coupling the crystallised constituents of the veins—can, quartz, lime, gossan, and ores—with geological features generally, I am confirmed in the belief that Belgrave will prove a great and important prize. It is stated by those who ought to be well acquainted with the working now filled with water, that at the 117 fathom level, 70 fms. east of shaft, a sump was sunk and large quantities of ore extracted. Up to this discovery it was apprehended that the long course of ore previously wrought was unbottomed. At the bottom of this sump the lode was cross-cut to the foot-wall, and a sight presented unprecedented richness throughout its long and prosperous career; in fact, both forebears were solid masses of ore. Subsequently three other cross-cuts were extended at greater depths, and with equally good results. These discoveries prove that the ore is not unbottomed, but more concentrated and pure in depth. Hence I have no question of doubt as to the fact that the next section of 50 fms. in depth will be found far richer and purer in its yield of lead ore than hitherto the workings

have proved. In my next I shall refer to the Black Mountain and East Pant-dū, merely observing that I hope that Capt. Roberts will be as successful in the former as he has been in the latter. Both of these are in the millstone grit formation, as also is the Cribwlyn and Lead Era. This latter is likely to prove an early, inexpensive, and important prize.—*Nant, Llanarmon, Aug. 20.* **J. A. EDE.**

#### THE ENGLISH LEAD TRADE.

SIR.—If one thing more than others connected with lead mining should illustrate the great advantages arising from being able to utilise water-power, it would be the continuance of the present low values for ores, as it must be apparent to everyone that, if under existing circumstances profit is to be made, it is chiefly to undertakings which possess opportunities so afforded for inexpensive working that we must look for such a result, inasmuch as during the period named in a former communication, when some statistics of produce of the mines of Cardiganshire (which for the greater part enjoy this privilege) were given. The fluctuations in ore value were on more than one occasion fully as great as those of the past year or so. This fact, however, did not preclude the division of profits for the time being, so far as the mines of this county were concerned, and yet we find on one or two occasions that ore from the Lisburne Mines realised only 9L. 5s. and 9L. 10s. per ton for a whole year through; such average estimate, of course, including sales of the rich as well as poor ores from the several mines of the company, and necessarily showing that the quotations for certain quantities were infinitely lower than have been prevalent ever within the past few months. How much of the profits so realised by the mine proprietors may be considered to have resulted from the use of water-power instead of the more expensive steam machinery does not, perhaps, appear in any published report, but the fact that the mines under consideration are so worked ought to afford some estimate of the value to be attached to such an advantage in seasons of low prices for produce, when we take into account the amount of cost which otherwise must have been incurred.

So numerous are the productive and profitable mines which may fairly be said to constitute the Lisburne range that the difficulty would be to name one of them that in its past career has not only yielded large quantities of ore but has given increased produce when worked in depth; it is singular, therefore, that so very few have been developed with such vigour as one would have expected to find when the facilities for so doing are borne in mind, as the deeper and more productive levels are comparatively unworked, notwithstanding the abundance of motive power requisite for sinking, drawing, &c., which is in many cases absolutely at command, and the additional encouragement which the prosecution of work in a legitimate and miner-like manner in some few instances has already afforded. Of these it must be said that in almost every case the result of the extended operations has been the discovery of increased wealth, while it has now become a matter of history that even such mines as Glogfawr, Glogfach, Logylas, Frongoch, and others—that each in their turn have given almost fabulous riches to their fortunate possessors—would for the greater part have still remained undeveloped but for the perseverance with which a well-known able mining celebrity (now no more) insisted that the immense mineral wealth since realised "only awaited the miner's pick"—a prediction which has already been sufficiently fulfilled, but which will probably be still more amply justified in the future. **JOHN OWEN.**

*Bishopsgate-street Within, Aug. 22.*

#### GREAT WESTERN COLLIERY COMPANY.

SIR.—In last week's Journal, under the head of "Report from Cornwall," there is a reference made to the respective merits of the Main Colliery and Great Western coals, used at the West Seton Mine, which may prejudice the latter in the Cornish market. It is stated—"They used to buy Main Colliery coal at 15s. 6d., which gave a duty of 67,000,000. Now they buy Great Western at 17s. 6d., which has only raised the duty to 72,000,000," &c., the inference being that the lower priced coal is the cheapest. This, of course, we are bound to admit if the prices and the results are correctly stated. Of the prices we do not care now to speak, but as to the published results we scarcely think they are correct. We have little hesitation in saying that our large coal will do 20 to 25 per cent. more duty than the coal formerly supplied, or supposed to be supplied, from the Main Colliery, and that our large will do far more duty than the large from any Neath colliery. Whether this is so or not can easily be proved. We are quite prepared to have our coal fairly tested against the coal hitherto generally used at Cornish mines, believing that the results would astonish some of the managers, and convince them that they would save considerably by using our coal at the higher price you mentioned. **WM. JONES.**

*Agent for the Great Western Colliery Company, Limited.*

*Cardiff, Aug. 22.*

#### THE IRON ORES OF CORNWALL AND DEVON.

SIR.—It gives much pleasure to those interested in mining in Cornwall and Devonshire to see in the Journal of August 10 that a strong company is being formed for thoroughly working the large deposits of spathic iron ore in the Perran great lode, and others adjoining, as well as the silver-lead lodes, and it is generally believed, if efficiently worked, that it will prove a success to all who may succeed in securing an interest, as the quality of the iron ore is good, as also is that of the rich red and brown hematite lodes worked by the Ebbw Vale Company, at Brendon Hills. But I cannot agree with the statement of answer to Question 250—of there being a small deposit of this rich ore on Exmoor, as I believe that the main and large bodies of ore in the Western Counties are in these hills, and when the railway now being projected is made to Combwich an almost unlimited quantity of this ore can be gotten above the valleys, and when needed to go below there is sufficient water-power for pumping and drawing the ore from any depth. I also believe there is a sufficiency of the richest quality iron ore in the Western Counties to supply South Wales with the best material for steel making for ages to come, and when the railways and tramways to them are opened there will be no need, or we shall not be dependent, for the importation of iron ores from Spain or other countries, as we have near the smelting works equally good, if not better, ores for the making of steel, and that can be delivered at the furnace at a cheaper rate, and good quality, material at a less price must eventually tell its own tale and come off victorious.—*North Devon, Aug. 19.* **M. E.**

#### OLD TREBURGETT SILVER AND LEAD MINE.

##### GREAT EXCITEMENT AT ST. TEATH.

SIR.—About fortnight since the miners of Old Treburgett sued the executors of the late Mr. John Tucker, of Branscombe, Devon, for two months' money owing to them for work done in said mine. The facts of the case are these:—Some time ago the mine fell in liquidation, and Mr. Tucker restrained the materials for dues, at the same time appointing his son, Mr. Samuel Tucker, as his representative. The old gentleman fearing the men would stop working (which I hear they would have done) authorised Mr. S. Tucker, by letter, to employ them, with the assurance that all was right with reference to their wages, which the said gentleman positively swore to before Mr. Justice Bere, at the Camelot County Court, and what surprised every one in Court after such evidence (besides several important witnesses) was the extraordinary judgment given by his honour.—That the men be paid off with the proceeds of the lead raised at the time, which will amount to about 4s. in 1L. On this I make no comment. Now, what has raised the indignation of the men is, that a few weeks before the Court the agents advised the men to "sue the executors of the late John Tucker, for they were certainly liable;" but when Capt. Hancock gave evidence in Court, to the men's surprise, he swore that Mr. Felix Wilson, of London, the liquidator, was the only employer. This unexpected event, and the stopping by them (the managers) of one of the best mines in the county, simply because they fell out with one of the lords, has exasperated the miners and the general public that they (the captains) have seen fit to have two or three policemen in the village

every night, as they think, to protect them. We feel fully persuaded that such a quiet well-behaved lot of men would not in any way commit themselves, but we are forcibly reminded of a saying of Shakespere's, "Conscience makes cowards of us all," as up to this time this has been one of the quietest villages in England.

*St. Teath, Aug. 20.*

**OBSERVER.**

#### MINING AS AN INVESTMENT FOR CAPITAL.

##### PANT-Y-MWYN MINES, NEAR MOLD.

SIR.—It is very satisfactory to find that these mines are beginning to bear out the opinion I expressed of them in my letter of October last, at the same time recommending the purchase of shares at the then price, 2L. each, or par; the present market value being 5L. to 5L. or 250 to 262½ per cent. premium, and when more vigorously developed will soon be trebled. During the year ending June 30 264 tons of lead ore have been raised, the value being 323L. 5s. 10d., the working costs were 1342L. 1s. 2d., leaving a profit of 1889L. 3s. 10d., or 58½ per cent. on the total sales, the working cost being 41½ per cent. The dividend for the half-year is 2s. per 2L. share, equal to 10 per cent. per annum.

##### THE BRITISH SILVER-LEAD MINES, NEAR FESTINIOG.

The late discovery at these mines still continues, and is of the same value as last reported. We have also discovered a fine "sett stone" on the property, which with the silver-lead ore, blonde, and slate will be opened out as rapidly as possible, and, it is fully expected, give large profits.

It is also very pleasing to record that the consumption of pig and sheet lead is increasing greatly, the imports last month being nearly double that of the corresponding month last year. With the aid of boring machinery there is no reason why this country should not supply its own market, and as cheap as our foreign friends.

*Berse Cottage, Aug. 21.*

**JOHN L. M. FRASER.**

#### MINING IN CARDIGANSHIRE—TYN-Y-FRON.

SIR.—Being in company with Mr. T. P. Thomas underground at this mine on Aug. 11, I found that the deep adit level had laid open a rich course of lead and blonde ores for 70 fms. long, the lode in places being considerably more than 60 ft. wide, and since we commenced to cut down the sides of the Frongoch Mine I have not seen its equal. In my opinion a great deal more, and to the purpose, might have been said of the prospects of this mine than has hitherto been expressed; but as it is not my intention (at present at least) to make a long report, I will merely say that it is evident to any practical miner, and more especially to those who have had a long term of connection with the mines of this county, that the many different branches of lead and blonde ores are concentrating in depth, and that in 15 fms. under the present adit workings one of the finest courses of ore may more than fairly be expected to be developed than has been done since the time I have made allusion to the discovery at Frongoch Mine.

**ABSALOM FRANCIS.**

*Aberystwith, Aug. 21.*

#### PANDORA MINE.

SIR.—It is not my intention to reply to the anonymous letters (doubtless all emanating from one source, for there is a wonderful similarity in their style) in reference to this matter. Writers who can make accusations and cast innuendoes against an open opponent, and yet dare not sign their names to what they write, can only expect to be treated with silence. I will reply to any genuine letter, but not to an anonymous one.

The letter of Mr. Cooke is in a different category, and I will answer him by expressing my surprise that he who beyond all shareholders has taken counsel with me as to the necessity of some steps being initiated for the purpose of procuring a different local manager, a change in the constitution of the board, and an alteration of the office, should now "hope that confidence may be renewed in the present management."

Has all this change of views come about because the proposed office is a different one to what he expected, and how is it that he commends to the shareholders' perusal a circular of the directors, containing allegations which he admits to be incorrect? Mr. Cooke will excuse me if I say that his sudden support of a management with which he is professedly discontented is very much like an attempt "to run with the hare and hunt with the hounds." Mr. Cooke is quite in error in supposing that I covet the appointment of secretary of Pandora, I have no intention of accepting the secretaryship of that or any other mine. In conclusion, I may say once and for all that it is a matter of indifference to the Mineral Corporation whether its offer is accepted or not by the Pandora shareholders. It is perfectly agreed that the requested assistance will be given on no other terms than those offered. **J. H. CROFTS.**

#### PANDORA MINING COMPANY.

SIR.—I have received another long circular from Mr. Crofts, which is one of the weakest and most laboured productions I ever read. It in no way meets the plain statements of the directors, who have, however, issued a notice to say that it contains important misstatements, like Mr. Crofts' previous circular, and that they will be fully replied to as far as is required at the general meeting on M. day. I am glad to hear that the directors will be supported by a large majority.—*Aug. 22.* **A LARGE SHAREHOLDER.**

#### PANDORA MINE.

SIR.—Absence from home prevented my seeing until now the letters respecting Pandora in the Supplement to the Journal of Aug. 10. This I regret, as it was due to the shareholders that they be at once disabused of the idea that my letter was in any way inspired by the management; it was not even written with their knowledge, nor do I think the language I used was such as to warrant Mr. Crofts' ungenerous insinuation, either as regards myself, the anonymous writer, or the directors of the mine, to whom I am altogether unknown. I am entirely independent of and unconnected with them, except as an ordinary shareholder; nor have I had any communication, either direct or indirect, with or from the management, except what has been furnished to every shareholder. But this does not prevent my exercising my ordinary common sense, the expression of which anonymously will cause my words to be regarded at all only so far as they find an echo in the common sense of others also.

Pandora has a number of shares unissued, and, as the directors have shown, requires a certain additional outlay for profitable working; but I do not see that need, for the money these shares would produce necessarily implies such mismanagement as would warrant so sweeping a measure as a change in directors, mine captain, and London office; the whole of the working staff, in fact. And what are we asked to accept instead? Who are the "Mineral Corporation" and who are their so trusty directors that we are to place our mine in their hands? These and other questions put by our directors yet await an answer. The bait thrown out, the taking of the 700 shares will, by the time the meeting of Aug. 26 is held, have ceased to possess any attraction, as they will have been taken up amongst ourselves, it appears, and will furnish the necessary appliances for the proper and uninterrupted working of the mine. Instead of turning out our directors, let us strengthen their hands to do what they themselves propose.

With respect to the local management, if it can be shown to the satisfaction of the shareholders that Capt. Nottingham's absences have been prejudicial (which, we must remember, has been insinuated only, and not proved), let a more constant attendance in future be required, and let him be paid accordingly.

As to change of office, allow me to ask what mines in Mr. Crofts' office have been so very successful as that we should, for his sake, row overboard a tried and respected servant like Mr. Murchison?

Let me, even anonymously, ask my fellow shareholders not to be hasty in this matter, but to read carefully and dispassionately the published answer of our directors to Mr. Crofts' circular, an answer which I for one consider straightforward and satisfactory, and at the coming meeting to require the very fullest and most unreserved information as to the Mineral Corporation, its status, its management, and its prospects. Even if dissatisfied with our present ma-

agement, we are not, therefore, to place implicit confidence in new and untried blood. If we are to put aside the "known present," let it at least not be for a future even worse than unknown, of which the knowledge is suspiciously withheld from us; for I regard Mr. Crofts' answers to the directors' queries as being to the last degree meagre and unsatisfactory. Let me plead earnestly against impatience, too frequent a failing in mining enterprise, not for the sake of captain, directors, and London manager only, to whom we might be doing an injustice, but on our own account to avoid a leap in the dark, which is at all times dangerous, and might turn out an irretrievable mistake, to be repented not only once, but always.

As to Mr. Kirk's letter, I can only say that it would have been better if it had contained more of logic and less of feeble sarcasm. I think I begin to see a little further into the "millstone," and, notwithstanding the dust thrown in my eyes, am still—

NOT ALTOGETHER BLIND.

#### PANDORA.

SIR.—With reference to Mr. Crofts' statement that he was applied to about placing the unissued shares, it is right that it should be pointed out that the board of directors had nothing to do with such application, though it does not seem of any importance if it had been so. The directors state in their circular, "the board received through one of its members an intimation that there was a prospect of Mr. Crofts placing the 700 unissued shares," and Mr. Crofts' first letter on the subject was not addressed to the board or to the office of the company, as shown by the correspondence published. From time to time during four months it seems that the directors were led to believe that Mr. Crofts would most likely place the shares on getting a commission, and this prevented the directors from taking other steps. As soon as they received the terms ultimately proposed they at once offered the shares to other persons, and succeeded in placing most of them in much less time than Mr. Crofts took to try to do so, while he never stated how they were to be paid for.

Aug. 21.

A SHAREHOLDER.

#### MINERS' WASTE OF TIME.

SIR.—A large amount of intelligence has of late years been brought to bear on the various departments of mining industry, except in the "duty" of the steam-engine, which has greatly declined. The duty, many years ago, was 80 or 90 millions (pounds raised 1 ft. high by the combustion of a bushel of coal); now the highest duty is, I believe, about 60 millions. I should like to have the cause of this declension elucidated. We have heard a good deal from time to time about "a fair day's wage for a fair day's work." There is no sin, I think, under the sun more common than that of servants robbing their employers by waste of time in idleness and skulking, when free from the observation of their overseers; but the waste to which I intended more especially to refer is that of the days when they do no work at all. It has been said that miners work only 19 days in a month—that is, after deducting four Sundays—seven days less, in a 30-days month, than any other classes of workmen—to wit, carpenters, masons, smiths, husbandmen, &c. And this waste of time has been committed with the concurrence of the managers in what are called well-conducted mines. Why this has been permitted I am at a loss for a reason; but I defy any man to supply a satisfactory reason for the custom. Miners rarely or never work on "pay-days;" and if the pay-day occurs on Friday, they do not work on the next day, and very often on the following Monday they are also absent—some of them at the public-house. As a general rule, miners abstain from underground work every Saturday. I have authority for stating that they work only 19 days in a month; and when they go underground they remain too short a period—sometimes only six hours out of 24.

Surely, now that economy is the order of the day, and so necessary on account of the low price of the ores, mine agents should insist on a reasonable devotion of time to active work underground. I suppose that most of the present agents are too wide-awake to be imposed on by the miners' trick of colouring (by smoke) the ores in the ends of the levels, in order to get a high tribute, as many have done very successfully. I know of two remarkable cases of this nature.—Aug. 20.

ADVENTURER.

#### THE MINES OF THE PARYS MOUNTAIN.

The forthcoming Transactions of the Manchester Geological Society will contain a very interesting paper on this subject by Mr. THOS. F. EVANS, Government Inspector of Mines. On the northern coast of Anglesea, about two miles from the shore, is a little hill, which, although rising no higher than about 500 feet above the level of the sea, and bearing over a large portion of its surface a soil deep enough for the support of a vigorous vegetation, is yet almost entirely destitute of a blade of grass, a bush of gorse, or even a sprig of heather. This is the little eminence once rendered famous throughout the world under the name of Parys Mountain by the enormous quantities of copper ore annually extracted from its southern slope. Its mines were in modern times first successfully opened in the year 1768, and from that time up to the present day they have been prosecuted without cessation. Although subject like all mining enterprises to alternations of richness and poverty, and frequently adversely affected by mercantile depression in their staple commodity, they have maintained their existence with a tenacity which can be explained only by the huge development of the ore masses, and the general regularity of their method of occurrence.

South of Parys Mountain a band of shaly slate trends from east to west, and beyond this southwards a belt of granitic and gneissic rocks observes the same direction. Parys Mountain itself may be described as lying in the narrow band of Silurian rocks which traverse the isle of Anglesea. The general mass is composed of five great rock masses. The northern slope consists of shaly slate, contains small veins of quartzose and felspathic rocks, with occasional bands of a variety of phonolite. A huge vein of quartz, forming the natural backbone of the hill, is known as the Carreg-y-dol lode. Then there is a great mass of felspathic rock, which varies considerably in colour and character in the course of its length and breadth; a band of deep blue slate, and a second band of felspathic rock, very similar to the first, which underlies the whole of the rock masses composing the mountain. Mr. Evans opines, as the result of observations made over an extensive area, that these rocks are of the same age, origin, and character as those great masses of rock styled by Ramsay felspathic ashes, volcanic conglomerates, and contemporaneous felsstones found intercalated with the schists in a very large proportion of the area of the Silurian system.

The beds of hard rock which interlie the great slate veins of Festiniog, and termed by the Welsh slate miners "Gwenithfaen," are in many places identical in appearance with the rock masses now under notice, and there is, probably, not a rock in the neighbourhood of Festiniog and the country lying some miles to the north of its slate mines of which the analogue may not be found in the narrow strip of Silurian rock in which our subject occurs. The slates and schists also resemble each other so closely in both places that those veins which have been cut at a great depth in the mines of Anglesey would have furnished a supply of excellent roofing slate but for the adventitious presence of metallic ores, which decompose on exposure to the atmosphere. In driving south some years ago in the Mona Mine, a vein of slate of great width was cut, which turned out, even in the area of a drift of 7 ft. by 5 ft., slates of a large size and of excellent quality and colour. It is yet a question how far this discovery might be made profitable.

Parys Mountain may, in fact, be regarded as an outlying piece of ground, geologically identical with the region in which the great slate mines of Festiniog occur, and from which it differs only in being developed on a much smaller scale, and in being highly metalliferous. The rock masses are traversed at right angles to the strata by two faults—the great cross-course and the Carreg-y-dol cross-course. The latter is a mere transverse cleft, which has had hardly any effect upon the relative positions of the rocks forming its sides; but the western or great cross-course is, on the contrary, of considerable width, varying from 20 to 60 ft.; it is filled with mixed and broken masses of the neighbouring rocks, and has greatly

disturbed the otherwise regular and almost continuous strata. Excepting the great quartz vein referred to the strata of hard rock are felsite. They vary greatly in colour and character in different places. In some places where they abut against the shale they are of a deep blue colour, obtained apparently from the neighbouring rock; in others they are tinged with reddish ferruginous streaks, while as they approach the great quartz vein they assume first a delicate buff colour, and then become gradually whiter. The felsite between the cross-courses consists in many places of a soft concretionary mass, which contains so many small concordant nodules that the miners call it Carreg-y-grogan. In these nodules kernels of copper pyrites—the prevailing metallic ore—occur so largely that this ground has formed one of the most profitable resources of the mine in which the formation occurs.

Coming to the metalliferous deposits, Mr. Evans explains that beginning at the north a large lode of copper pyrites, associated with a matrix consisting of quartz and shaly slate, and known as the North Discovery Lode, extended from a few fathoms west of the great cross-course to a distance of about 90 fms. westward. This ore deposit partook more of the character of a lode, as that term is usually understood by miners, than any other important formation discovered in these mines. It was well defined hard slate-rock as heading and hanging walls, and differed from the other neighbouring so-called lodes by dipping at an angle of 60°, according to Mr. C. B. Dyer, the late able manager of the Parys Mine, who says that the ore deposits contained in the lode dipped or shot west at the rate of 3 ft. in a fathom. It was also distinguished from the others by the almost entire absence of felsite or felspathic rock. This great lode has now been almost entirely worked away, after producing during recent years copper ore to the value of close upon, if not over, 1,000,000l. sterling. With the exception of some small quartzose strings containing copper pyrites and small streaks of galena and blonde, which have not as yet been found to include any metalliferous deposits of economic value, the next lode is the one previously styled the Carreg-y-dol lode, a name said to have descended from a date long anterior to the present working of the mines, and supposed to signify the rock at which toll or tribute of ore was taken at a very remote period. This bed of quartz, which varies from 5 ft. to 60 ft. in width, contains in some places bunches of copper pyrites of great extent, which have from time to time been profitably wrought. It contains also iron pyrites, but not so abundantly as the rocks lying to the south. In driving along its course drusy vugs or lochs are occasionally met with, which, when entered with a candle, display a scene of intense brilliancy. One of these encountered a few years ago was 8 fms. deep and 3 fms. to 4 fms. in height. The ore in this lode occurs in patches, and appears to dip westward. The felspathic mass underlying the Carreg-y-dol lode contains a great quantity of copper pyrites, in strings varying from a mere washing on a jointy facing to embedded veins and bunches, sometimes forming beds several feet in magnitude.

But the most interesting feature is the open-cast. At the plane of juncture between the felspathic band and the shaly slate two enormous excavations termed open-casts may be said almost to cut the mountain in two. They vary in depth from 18 to 23 fathoms, and, following the strike of the strata, occupy a surface area of about 12 acres. They are bounded on the north by the felsite, and on the south by the shaly slate band, which occurs between the two parallel strata of felsite. At this point occurred the great body of copper ore which once exercised as powerful an influence on the copper market as that obtained in the present day by the importations made from the mines of Chili and South Africa. The ores were comparatively poor, they contained on an average not more than 5 or 6 per cent. of metallic copper, but as there was not for the time a limit to the quantity the mines could be made to produce the owners held the copper market almost entirely in their own hands. This is a condition of prosperity which has long passed away, but as history repeats itself even in the case of mines, and as the ore-bearing ground of this fertile tract has as yet been but partially explored, the time may yet arrive when the mines will once more enjoy their ancient importance. The metalliferous mass worked here consists of a bed of iron pyrites, lying on a bed of copper pyrites, and occasionally a huge bed of "bluestone," which by the analysis of Mr. C. H. Hills, of the Amlwch Works, contains—lead, 11 to 13 per cent.; zinc, 30 to 32; iron, 14 to 16; siliceous gangue, 16 to 18; sulphur, 24 to 26; and copper,  $\frac{1}{2}$  to 1 per cent., with 10 to 14 ozs. per ton of silver and 2 or 3 dwts. of gold. The bed of this mineral varies greatly in extent, being found in one place of a thickness of 50 or 60 ft., while in others it is a vein only a few inches thick, or entirely disappears. Very large quantities of it might be raised, but the profitable separation of the metals it contains having so far baffled the most ingenious metallurgists the mineral now remains almost entirely unwrought.

The beds of pyrites and bluestone appear to thin out as they descend, while the copper becomes freer from impurities, and consequently richer in produce. And not only do the felspathic and other rocks contained within its area exhibit disintegration, but the metalliferous deposits there occurring have been and are undergoing a process of decomposition, thus exercising upon the mines an effect which may be termed highly important, both geologically and economically. As previously stated, the surface at this part has been excavated to a considerable extent, and the original configuration of the surface can, therefore, be only guessed at from the surrounding edges: but it is possible the surface was a gossan which in some places was an ochre of various shades of yellow and red, and in others a cindery crust presenting a beautifully iridescent surface, which contained bands of the sulphate of lead, and on its exterior well-defined crystals of the same mineral, in the form of Anglesite. The sides of these open-casts thus present a variety of brilliant colours, which render them an object of singularly gay appearance in the strong light of a clear day. Going lower down we find the so-called lode presenting every appearance of decomposition. The felsite has become a soft mass previously termed shelly, small strings of quartz occurring here and there have become as porous as pumice from the decomposition of the copper and iron pyrites they once contained, the heading shale has become a soft mass of clay, while the water issuing from the ground is a strong solution of the sulphates of copper and iron.

The waters of these mines contain generally a considerable quantity of the two sulphates, but it is in the part now referred to that they are strongest by far, and it is a question whether the waters rising here do not, in percolating through other parts, induce a decomposition which would not have occurred but for their presence. The water is raised by means of wooden pumps, and stored in reservoirs specially prepared for its reception. Here it deposits any clay and grit contained, and when clear it is tapped off as required into the precipitation tanks. These tanks are filled with old iron, and the cuprous water is allowed to flow first into the head "pit," and from it continuously through a series which is lengthened or shortened as found necessary with the varying strength of the water passing through. Four times a year the precipitate thus obtained is thus collected. The water is first drawn off, all the iron is then placed upon the "backs" of the wavy bottom, and the copper attached to it is washed away by throwing violently against it by means of scoops the water still remaining in the hollows. This process accomplished, the precipitate is allowed to subside, and the clear water is drawn off by taking out plugs placed in the middle of each trough. The precipitate is then carried in casks to a pit, where it gradually acquires the consistency of soft mud, and is then taken to a reverberatory furnace, where it is dried and made ready for smelting. The water afterwards flows into large reservoirs, some of several acres extent, and there by natural process deposits a sediment of sub-sulphate of iron, or precipitated yellow ochre. Some thousands of tons of this article are annually sold; it is used largely as a gas-purifying material, and considerable quantities are calcined for the production of the various iron oxide paints and Venetian red. These mineral waters must have issued from the ground for a very long period, for south of the mountain there is an extensive peaty tract, portions of which are cuprous, while others contain so much ochre as to produce excellent gas-purifying material. When the price of copper was high the cuprous peat was largely burned, and the ashes thus obtained, containing from 2 to 4 per cent. of metallic cop-

per, were smelted with other ores of the mine. The streams of water proceeding from the mines are of a deep port wine colour when first pumped out, they gradually lighter in colour as they deposit the ochre; when they enter the sea they impart to it a yellow tinge, which sometimes stretches out a mile or more into the channel.

In former times the copper ores raised at the mines were calcined in huge heaps upon the mountain, the sulphur thus expelled being saved in long brick chambers, termed "receivers," and afterwards sold. This mode of calcination was exceedingly cheap, no fuel being used, but it was very slow, and necessitated the holding of large stocks, and it has now for some years been discontinued as unprofitable, the sulphur the ores contain being used in the manufacture of sulphuric acid by the Messrs. Hills, whose chemical works are at the neighbouring port. The ores raised here were formerly smelted into fine copper, of which from 500 to 800 tons were annually sent away, but the increasing price of coal, and the enhanced value of labour, rendered it necessary a few years ago to limit the smelting operations to the making of regulus only.

As to the geological history of the deposits Mr. Evans thinks that it may, perhaps, be correctly stated thus—A sediment was deposited at the bottom of a Silurian sea, into which flowed a stream of water containing like that now issuing from the mines certain sulphates in solution. These sulphates became converted into sulphides in the presence of decaying organic matter, and the whole mass became solidified in the form of horizontal strata of the same nature probably as the kupferschiefer, or copper slate, now worked in Germany. Another operation arising from the mutual attraction of the same minerals for each other now began, which ultimately brought together the various substances previously distributed generally throughout the mass. Hence arises the uniform regularity of the strata in strike, dip, form, and order of succession, a regularity which is no less characteristic of them than of the far larger analogous masses occurring in Carnarvonshire and Merionethshire, and which may possibly receive an explanation by our electricians. The only difference is that in the corresponding felspathic rocks of Carnarvon and Merioneth metallic ores are but rarely found, and are never more than mere valueless strings. If this theory is correct these great rock masses should no longer be termed igneous, and ought instead to be designated huge segregated strata. Mr. Evans is well aware that in framing this theory he is running counter to the views of our most eminent geologists, and having a full appreciation of the importance of the question nothing but a conviction of the soundness of the views enunciated would have induced him to bring them forward. He hoped the remarks would draw attention to the subject, and confidently expects that they will hasten the day when the terms igneous, volcanic, and intrusive shall cease to be applied to a single rock mass in the Silurian and Cambrian formations of Wales.

#### THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the idleness which has prevailed for some time past in this market has, if possible, increased. Prices of the few leading shares have a drooping tendency, and as regards any others the majority are almost unsaleable. It is important to observe a continuance of the reported renewal of industrial activity in most parts of the country, which is an influence that should have a most beneficial effect on prices as the season draws on. In shares of iron and coal concerns Chillington has further advanced 10s., but Monkland (pref.) are 1s. 6d. lower; also Monkland and Omoa and Cleland each 6d. The meeting of the Omoa and Cleland Company is to be on Aug. 30. The Mersey Company made a loss of 12,163/- on last year's operations, principally owing to unremunerative prices ruling for steel rails, and it has been decided to discontinue that branch of the manufacture for the present. As regards their prospects for the current year the Chairman stated they are now brisker, and getting back customers who had left them. Loud complaints are being made in the Scotch iron trade, half the blast-furnaces are idle, and owing to the Yorkshire people producing at much lower prices it is impossible to see why the other half are kept in blast; that they can continue to be worked, unless the price of pig-iron rises or some economy can be effected in the cost of production, or in the cost of sending to market, is apparently impossible. Thus one of the most important trades is threatened with extinction unless the commercial depression soon comes to an end. Bickford. Vaughan (1000, paid) are at 11s.; ditto, B, 37½; and ditto (pref.), 19½. Cardiff and Swansea, 20s. to 25s.; Charles Cammell and Co., 8½ d.; Chapel House, 50s. to 60s.; Chillington, 65s. to 75s.; Ebbo Vale, 8½ to 9½. Great Western, 50s.; ditto (pref.), 5; and ditto (debentures), 6s. John Bagnall and Sons, 27s. 6d.; Mersey Steel, 33s. 9d. dis.; Monkland (pref.), 6s. to 6s.; Muntz's Metal, 70s. prem.; New Charlton (pref.), 6s. to 9s.; Nant-y-Glo and Blaina (pref.), 24s.; Newport Abercarn, 9s. 6d.; Omoa and Cleland, 12s.; Pelsall, 11½ dis.; Rhymney, 18s.; Sandwell Park, 15s.; Scottish Australian, 35s. to 40s.; Sheepbridge, 20½ dis.; Skerne, 6s.; Staveley, C, 73½; South Wales, 4½; Thorp's Gawber Hall, 40s.; Tredegar, 13s.; West Mostyn (pref.), 20s.

Shares of foreign copper and lead companies have been freely offered. Tharsis (new) are reduced 1s. per share, Tharsis 11s. 3d., Cape 10s., and Huntington 1s. The total returns of Cape ore for June were 1075 tons of 30 to 31 per cent. In the same month New Querada produced 960 tons, of which 800 tons had been assayed, and gave 14½ per cent. net. This company will in future ship two cargoes monthly till the end of the present year. Alamillos are at 1½ to 1½; Linares, 4½ to 5; New Querada, 1½; Rio Tinto 5 per cent., 6s. 6d.; Yorke Peninsula, 4s. to 6s.

Shares of home mines are quite neglected. There have been no sales of Glasgow Caradon 1s. paid share, but the new issue was sold at the same price as before, ¾.

Melyndwr Valley shares firmer, as it is stated the capital for the further development of the mine has been advanced by the proprietors. Lampyrdale are at ¼; Bedford United, 3s. 9d.; Bodidris, 1; Cwm Brea, 3s.; Cook's Kitchen, ¾; Devon Consols, 2½; Dolcoath, 24½; East Caradon, ¾; East Van, 4½; East Pool, 9; East Lovell, 8s. 9d.; Great Laxey, 19 to 19½; Gunnislake (Clitter), ¾; Gawton, 8s. 9d.; Herodsfoot, 3½; Hinstone, ¾; Leadhills, 5s. 3d.; Marke Valley, 1s.; Mwyndwr, 1½; Melyndwr Valley, 1; Mellnear, 3½; Parys Mountain, 8s.; Pennant, 4½; Penruthal, ¾; Phoenix United, 1½; Prince of Wales, 1s.; Rookhope, 13s. 9d. to 16s. 3d.; St. Patrick, ¾; South Caradon, 6s. 6d.; South Conduor, 11; South Crofty, 5½; South Frances, 3½; Tincroft, 7½; Van, 18; West Chiverton, 6s.; West Frances, 3s.; West Seton, 7½; West Tolgus, 5; Wheal Crebor, 11s. 3d.; Wheal Kitty, 32s. 6d.; Wheal Pever, 5s.; Wheal Uny, 16s. 3d.

In shares of gold and silver mines the principal business has been in Richmonds, which Parys has now altered, though they have fluctuated during the week between 7½ to 8 and 8½ to 9. The fall was ascribed to floods, and a recovery ensued on the explanation that the mine was 2½ miles away from the floods, and the shares have the appearance of rising again. This week's run is \$60,000, same as the previous week, and the furnaces are to be shut down for repairs on Aug. 31. Chicago shares should be good to buy now that a compromise has been effected with the Herschel Mine, and the day when operations will be resumed cannot be far distant. The cross-cut commenced at Don Pedro may also in due course attract attention to these shares. Frontino and Bolivia have improved on the returns for May coming to hand. They show a profit of 18.7, and 101 tons from the Silencio Mine yielded on average 5 ozs. 4 dwts. per ton. Antioquia has a loss of 73. on the same month, and Santa Barbara a profit of 430. in June. The produce of St. John del Rey for July has been 35,000 oits. (13,56 M.), and for eight days, first division of August, 9,000 oits. (3457.7). Birdseye Creek are at 18s. 9d. Cedar Creek, ¾ to 4½; Colorado United, 7s. 3d.; Chontales, ¾; Pedro, 8s. 9d.; Eberhardt, 4½; Emma, 2s.; Esquadero, 1s. to 8s.; Flagstaff, 10s. 6d.; Gold Run, 6s. 3d.; Javali, 8s. 9d.; Santa Barbara, 21; St. John del Rey, 27s.; South Aurora, ½ to ¾; United Mexican, 75s.

Gold Companies shares are quiet. Young's Paraffin and Broxbourne are offered at reductions of 2s. 6d. each.

Miscellaneous companies shares present no striking feature. Birmingham and Midland Counties Val de Travers are firmer, at 1s., as the capital is being reduced from 80,000, to 48,000. Milner's Safe, 8½, ex div. Palmer Shipbuilding, A,

also water-power sufficient to work the machinery in all seasons. Two inclines with connecting tramways, altogether  $\frac{1}{2}$  mile in length, have been constructed from the quarry down to the machine-house. Again, on Goresda as much as \$30,000. has been expended; this and the other properties are in a satisfactory condition generally. Since the year 1863 various companies have been spending their capital here, and after all it is left for the one at present being formed to reap all the benefit. There is a railway called the Goresda Junction and Portmadoe, which runs from Portmadoe to this company's quarry, the parliamentary rate for carriage of slate being  $\frac{1}{2}$  per ton. Before the last company stopped the monthly make of slates was increasing, and the prospects most promising. A fall of rock unfortunately occurred, and nothing more was done in the upper portion of the quarry. The working was transferred to the lower part, where a fine quality of slate was found. Only a little additional expenditure would have resulted in good returns. The properties are mostly leasehold, and in some cases the rent and royalty have been redeemed. The price of the whole properties, interests, and advantages has been fixed at \$15,000., and the share capital at \$25,000., in 500 shares, consequently they will start with a working capital of 10,000.

**HUNTINGTON COPPER AND SULPHUR COMPANY (Limited).**—A circular has been issued to shareholders of this company requesting them not to give their proxies to the directors for the meeting on Sept. 3. The reasons assigned for this request are that no equitable ground can be substantiated against the original directors, and that such action would only be wasting the company's funds. The funds, the revolutionists say, should be preserved for the future development of the mine, when a dividend might be earned if copper should rise very much. The shareholders will do well to differ from this circular, and strengthen the hands of the directors, as the action against the original directors is undoubtedly the course based on the best experience, and if successful will benefit them very much more than the Huntington Mine ever could.

**NEW MINING COMPANIES.**—Owing to several properties falling into the hands of the trustees it is likely companies will soon be formed to secure and work the principal ones. Amongst them is a copper mine discovered two years since in the new locality with splendid ore to surface. The principal one, however, is a china-clay sett, the best known in Cornwall. It can return at least 2000 tons monthly. The sett is close to the railway; in fact, the bricks are filled from the capacious drys. The quality is of the best on the market, and commands 4s. per ton at Runcorn. The drys will treat from 200 to 250 tons at a time, and as there are now about 2000 tons ready to go on with, it is apparent the company will make large profits from the very commencement. The capital is not to exceed 12,000.

Subjoined are this week's quotations, &c., of mining and metal shares quoted on the Scotch Stock Exchanges:—

Capital. Dividends.

Description of shares.

Per share.	Paid up.	Previous.	Last.	Rate per cent.
COAL, IRON, STEEL.				
£ 10 28	£ 7 27	£ 7 27	£ 7 27	Arlington Coal (Limited) 75%
10 10	4 4	4 4	4 4	Bentley Coal (Limited) 50%
10 50	22s 6d	34s 6d	34s 6d	Bolebow, Vaughan, and Co. (Lim.) A. 59 1/2
10 10	10 10	10 10	10 10	Cairnthal Gas Coal (Limited) 8
10 10	4s April, 1876	10 10	10 10	Huntington Iron (Limited) 70s.
10 7	—	—	—	Olydy Coal (Limited) 7
28 20	10s Dec, 1874	10s Dec, 1874	10s Dec, 1874	Ebb Vale Steel, Iron, and Coal (Lim.) 91 1/2
10 6	nil	nil	nil	Fife Coal (Limited) 70s.
10 10	nil	nil	nil	Glasgow Port Washington Iron & Coal (L) 50s.
10 10	—	—	—	Ditto Prepaid 50s.
10 10	—	—	—	Lochore and Capledrae (Limited) 80s.
10 10	—	—	—	Maribella Iron Ore (Limited) 65s.
10 10	—	—	—	Monkland Iron and Coal (Limited) 52s.
10 10	—	—	—	Ditto Guaranteed Preference 68s.
10 10	5	4	4	Ditto New 15s.
100 100	nil	nil	nil	Nant-y-Glo & Blaina Ironworks pref. (L) 24
6 6	nil	nil	nil	Omoro and Cleland Iron & Coal (L. & Red.) 12s.
1 1	15	15	15	Scottish Australian Mining (Limited) 37s. 6d.
1 10s.	15	15	15	Ditto New 15s.
Stock 100	nil	nil	Shotts Iron 91	
COPPER, SULPHUR, TIN.				
4 4	—	—	—	Canadian Copper and Sulphur (Lim.) 5s.
10 7 7s 6d	35s	35s	35s	Cape Copper (Limited) 30
1 1	7s 6d	21s	21s	Glasgow Cardon Copper Mining (Lim.) 21s.
1 15s.	7s 6d	21s	21s	Ditto New 15s.
10 93 1/2	nil	nil	—	Huntington Copper and Sulphur (Lim.) 34s.
4 4	—	—	—	Pannicello Copper (Limited) 20s.
10 10	61	61	61	Rio Tinto (Limited) 85s.
20 20	7	7	7	Ditto 7 per cent. Mortgage Bonds 15
100 100	5	5	5	Do. 5 p.c. Deb. (Sp. Con. Bds.) 66s 1/2
10 10	22s	20	20	Tharsis Copper and Sulphur (Limited) 23s 1/2
10 7	22s	20	20	Ditto New 16
1 1	—	—	—	Yorke Peninsula Mining (Limited) 5s.
1 1	—	—	—	Ditto, 15 per cent. Guaranteed Pref. 20s.
GOLD, SILVER.				
1 1	—	—	—	Australian Mines Investment (Limited) 8s.
5 5	7s 6d	7s 6d	7s 6d	Richmond Mining (Limited) 8s 1/2
OIL.				
18 7	6	15	15	Dalmeny Oil (Limited) 8
1 1	7s 6d	25	25	Oakbank Oil (Limited) 42s. 6d.
1 5s.	—	25	25	Ditto 12s.
10 10	7s 6d	2	2	Uphall Mineral Oil (Limited) "A" 8s 1/2
10 10	—	—	—	Ditto "B" Deferred 10
10 10	—	—	—	West Calder Oil (Limited) 15s.
10 8s	17s 6d	17s 6d	17s 6d	Young's Paraffin Light & Mineral Oil (L) 14s.
MISCELLANEOUS.				
50 25	5	6	6	London and Glasgow Engineering & Iron Shipbuilding (Limited) 24
7 7	15	10	10	Phospho Guano (Limited) 9
10 10	6	6	6	Scottish Wagon (Limited) 10s 13s 9
10 4	6	6	6	Ditto New 8s. 6d.
† Interim.	—	—	—	For six months of 1878.

**NOTE.**—The above lists of mines and auxiliary associations are as full as can be ascertained, Scotch companies only being inserted, or those in which Scotch investors are interested. In the event of any being omitted, and parties desiring a quotation for them and such information as can be ascertained from time to time to be inserted in these lists, they will be good enough to communicate the name of the company, with any other particulars as full as possible.

J. GRANT MACLEAN, Stock and Share Broker.

Post Office Buildings, Stirling, August 22.

ALMADA AND TIRITO CONSOLIDATED SILVER MINING COMPANY.

**TIRITO.**—Wm. Cleme, June 14: The drive west from the prospecting cross-cut, south of the south slide, is making good progress, and I think we shall communicate this with the tunnel in about three weeks. There is no change in this place from last week.

**PROVIDENCIA.**—The back stop in this place continues to turn out a fair quantity of decalcified ore.

**LA VIRGEN.**—The rise in this place continues to improve for green ore, but does not look well for black. I expect in a few feet more in height we shall lose all trace of black ore in this place.

**MINA GRANDE.**—The old stop here has no change worthy of notice.

**CRUZ VERDE.**—This pitch has nothing new to report.

**TIRITO.**—June 21: The drive west from the prospecting cross-cut, south of the south slide, has nothing to report. It continues to make good headway. I think we shall communicate next week.

**PROVIDENCIA.**—The back stop in this place appears to be slightly improving in quality.

**LA VIRGEN.**—The rise in this lode is gradually improving as it goes up for green ore. It is now suspended for awhile, as it gets very hot and troublesome for working. We have now begun a stop from the end of the rise. This stop will ventilate the rise, so that we shall be able to resume rising again very shortly. The stop is rather poor, and is a mixture of black and green ores.

**MINA GRANDE.**—The old stop in this place has improved in the past week as regards quantity; the quality appears about the same.

**CRUZ VERDE.**—The pitch continues the same as last reported on. We cannot yet report much on this place, as it has not yet got into proper shape.

**E. W. BREACH, June 14:** I beg to enclose additional to the plan of the mines. In the Mina Grande part the winze marked B is the one we stopped sinking some time since, as the bottom is barren quartz and felspar. We then drove the level marked 15, the north end of which is in solid ore. After proving that, the winze A was sunk 20 ft. (about), the west side of which at the bottom is likewise in solid ore, with streaks of yellow copper ore. Between the bottom of this winze and the end of the level we believe all is one, and of a better quality than usual, isolated stones having given upwards of 8000 per ton by assay. At the south of the south slide you will note we have only 31 ft. to open, and we shall then ventilate the end going under the Solidad, and be enabled to drive it, and continue the exploration. We have a fair prospect overhead in the Providencia Mine, where we can see ore sufficient to last for two months at the present rate of working. This is more than I have been able to calculate on for a twelve-month past. From the appearance of the rise put up to stop from the Virgin I am in great hopes it may change to a branch of green ore as we work upwards.

Referring, again, to the additions to the plan of the mines, I beg to direct your attention to a pencil line I have drawn across the tunnel, and written on it the word "wall." In the direction indicated by the line, and at that point, is a very well made wall, with all the characteristics of a main wall. To the west of it is the country ground; it carries a heavy clay selvage, flockan, and the ground in the eastern side of it is wet, even in this exceptionally dry year. Due east from this point, at a distance of 40 ft., we see on the surface the east wall of the Solidad workings, to the east of which is still lode ground. From this you may form some opinion as to the enormous width of this lode at this part of it. Further to the north we have no data whereon to base a calculation.

J. H. Cleme, June 20: The scarcity of labour and water will put a temporary check on explorations. Hands will be scarce for at least three weeks; the few persons that do not go to the feast must be kept working on ore. Very little can be done on the patio, and nothing at the furnace for the above reasons.

I will when the hands get back drive the 45 fm. level north: we have very great hopes of this level, as to work at this point we have to keep the water down in the shaft. I would recommend the driving of the 51 south at the same time if the state of the funds permit; this latter drift not being included in your list of proposed works, I should like instructions by telegram. There is reason to believe that no south slide will be found at this depth. The directors sent Mr. Cleme a telegram on August 9 to drive the 64 fm. level Tirito south. As regards the first proposed cross-cut on your list, I must tell you that from a point in the tunnel level, 22s ft. north of Providencia boundary, a cross-cut has been driven east 23 ft.; it is marked T on mine plan. With the next tracing I will send you a sketch of this. I recently sent for a tracing of the present working in the Virgin. About 23 ft. north of them is a cross-cut east from tunnel. The north end of the Virgin being in ore, although rather poor, we shall drive towards this cross-cut; this will explore the Virgin lode, and on communicating give air to these workings. The cross-cut referred to, which is old, is not on the plan.

The continuing of the west cross-cut 24 fms. north from line of transverse, Mina Grande, is important; the present end contains spots of ore. The communication drifts, near south slide, have not advanced so rapidly this week, owing to a change in the character of the ground. This work will be finished next week. The green ore stop, Providencia, is producing fairly. The ores from the Virgin stop are very dredgy—those in the back are green. When this stop changes entirely to green ore I will give you an estimate of its value. The spalling expenses on this ore are heavy.—Black Ore: The present stop, if stop it can be called, is in the 15 fm. level, and perhaps in the 12 fm. level (Mina Grande). There is not much change in the tributary stopes since last week.

The Mina Grande burrow still turns out good furnace ores. This place is of great help to us. Up to the end of May we obtained 715 tons of \$28 smelters. I believe there is in this dump a very large quantity of \$15 smelters. With the first rains I will run a few tons through the mill from various parts, and send you the result of the battery samples—\$15 smelters, yielding \$45 smelters heads, is at the price we pay for them a very good business.

The directors received the following telegrams (1 and 2) from Mr. J. H. Cleme, the new general manager, on the 23rd and the 30 July last respectively:—

1—"Commencement of rainy season."

2—"No profit for June. The lode in the west cross-cut is 2 ft. wide. (This is believed to be in the Mina Grande.—J. & Morgan.)

**REPORT ON THE ALMADA AND TIRITO SILVER MINES, MEXICO.**

**VIRGEN LODGE.**—J. H. Cleme, June 26: The stop in the back of the tunnel level is worked for a length of 45 ft. and a width of 6 ft.: it is worth on an average \$75 per cubic fathom for melting ores. It is impossible to say for what height this stop will continue profitable, the previous workings in the Virgin south show that this is probably a blind lode. The extreme south parts of this ore body ceased to be remunerative at about 7 fathoms above adit, and the northern parts at about 12 fathoms. A winze has been sunk in this lode 23 ft. below tunnel level; the bottom is poor. Indications at a cross-cut in the 10, which passes immediately under this winze, are so far promising that we shall sink this winze through to it. This communication will improve the ventilation in the Virgin stop. The winze referred to for a depth of 12 ft. was sunk through black ore worth \$15 per cubic fathom.

**PROVIDENCIA STOP.**—The greatest length is about 60 ft., and the average width 9 ft. I estimate its producing powers at 2 1/2 tons of milling ore, or \$125 per cubic fathom. This bunch below the tunnel level has been entirely worked out.

**CRUZ VERDES.**—This is a comparatively new venture, now being worked on trite.

**SAN PEDRO (South end of Tirito).**—There is reason to believe that the backs at this place, some 11 fms. above tunnel level, will pay to take down. The excavation is now full of attle, which it is expected can be profitably stamped to bubbles; steps are now being taken for stamping a few tons as an experiment.

With the exception of the Virgin, below tunnel, in none of the above-named places is the ore solid; it is interspersed through the worthless matrix in such a way that but little selection can be done underground; I, therefore, estimate the net returns as follows:—

Gross value of ore ..... \$50 per ton

Less—Reduction losses, 22 per cent. ..... \$11 60

Expenses, mining, milling, and incidental 28 00 = 39 "

Estimated profit per ton ..... \$11 "

The green ores concentrate with less loss of precious metal than the black, the silver in the former mostly carried by the carbonate of lead contained; the tailings generally assay about \$9 per ton, and are thrown over the dump.

**MINA GRANDE.**—The present stopes are very irregular in shape, and there is ground for believing that they are entirely in that offshoot from the main lode which has been named here the western branch. It is probable that the northern part of the 12 fm. level has not been driven far enough east to come under the main ore body, and to prove this a cross-cut has this week been started east from the north end in the 12.

The 15 fm. level is for the most part in solid ore, estimated value \$180 per cubic fathom.

**OLD MEN'S BURROW, MINA GRANDE.**—The dump is, to all appearances, capable of yielding a large quantity of furnace ores; no data exist for estimating even approximately the probable number of tons in this burrow.

**EXPLORATIONS.**—Indications in

## IMPROVED BLAST-FURNACE.

An improved construction of furnace has been designed by Mr. JOHN F. BENNETT, of Pittsburgh, U.S., the inner walls of which constitute substantially two trunks of cones, placed base to base, the lower one resting its smaller end upon the foundation or hearth, and extending upward one-third the height of the furnace, or to the point of greatest area in cross section, the upper cone beginning with its largest end at such point of greatest area, and extending upward two-thirds of the height of the furnace. The inner diameter of the furnace at the base or hearth is, by preference, two-fifths of the whole height of the furnace, and the area in cross section, at the belly or point of greatest diameter is not less than twice, nor greater than three times, the area at the base. The area of the throat is, by preference, the same as of the base, but may be increased by one-half when desired, as when the relative area at the point of greatest diameter is increased. The area of the charging opening in the throat, which is closed by a bell as usual, is made about one-half the area of the throat.

The tuyeres are inserted through the walls of the furnace at a height above the base equal to one-half the diameter of the base, or one-fifth the height of the furnace. This position of the tuyeres is given as affording the best results with a blast of about 5 lbs. to the square inch, and of a temperature of about 1000° Fahr. If the blast be weaker, say 1 lb., giving a blast of 4 lbs. to the square inch, then the tuyeres should be lowered a little, depending upon the capacity of the furnace, so as to keep the molten metal below sufficiently heated. The higher the tuyeres are placed, and at the same time a sufficient heat be maintained below, the more productive will be the furnace, for the zone or belt of fusion will thereby be increased. The dimensions given to the base of the furnace provide for a much larger plane chamber or zone in which fusion takes place, and the heat from the same is correspondingly increased. This of itself enables the tuyeres to be placed higher in the furnace than could be done in the old form, as such increased heat above assists in keeping the metal below properly heated.

Instead of placing the nozzles of these tuyeres even with the inner face of the wall, as has heretofore been done, they are, according to the present invention, made to project into the interior of the furnace, by preference, until their nozzles reach an imaginary circle, which will divide the area at that cross section into two equal parts, or in any case they project to such distance that the reflex currents made by the mutual action of the several jets shall not return or strike back against the walls of the furnace, or until they shall have been converted into carbonic oxide gas or carbonic acid gas, in which condition they will not act de-destructively on the lining. By this arrangement the walls are subjected in a much less degree to the de-destructive action of the heat and gases of the furnace, and in consequence of the diminished activity thus secured about the walls, particles of free or nearly free carbon settle upon and become attached to the walls. This accumulating carbon forms in course of time a coat of lining, closely resembling in its nature blacklead or plumbago, and making substantially the lower part of the furnace a blacklead crucible, which practically never wears out, for it continually renews itself by the action of the furnace as worn away by the attrition of the descending charge or stock. And it is partly with a view to the formation of this coat or lining that the furnace is constructed with so great an area in cross section at the base, as room is thus provided for the same between the face of the wall and nozzles of the tuyeres, and also provide for free passage of the molten metal and slags through the space between the nozzles, which is always kept clear by the action of the blast.

An additional advantage is also secured by the enlarged size of this part of the furnace, as the area of the zone of fusion above the tuyeres is thereby materially increased, and, other things being equal, the productive-ness of a furnace of given capacity depends upon the area of this zone; and, furthermore, the walls of the furnace being further removed the ascending gases, which are generated near the centre, do not as readily take to the walls for passage, but rather ascend up through the body of the charge and permeate the whole mass. This last result is also in a measure secured by the even distribution of the charge secured as before described by the reduced charging hole. By making the lower part of the furnace of a continuous conical form, not only is the area of the zone of fusion increased, as already described, but also the angle formerly made at the top of the well, or at the junction of boshes and well is avoided, thus securing a freer action of the furnace.

## PNEUMATIC DRYING-MACHINE FOR MINERALS.\*

The appearance and principal working parts of this machine, hatches, sieves, and plungers, are similar to those of continuous jiggling machines, as used for the finer sizes of mineral in ore or coal dressing; but the hatch, instead of being entirely is only partially filled with water, so that a space filled with air is enclosed below the plunger and sieve bottom. The material to be dried, such as purified slack from coal-washing machines, is received upon the sieve in a layer of about 6 inches deep, and is traversed slowly forward by a screw creper running along the whole length of the machine. The three plungers, one to each sieve, are mounted on a shaft by eccentric, and receive motion by a crank and lever combination, so that the down-stroke is made more rapidly than the up-stroke. As the piston descends the air standing above the water is compressed to an amount regulated by loaded spring valves on the sides of the hatch, and the layer of mineral is loosened upon the sieve, the holes in the latter being cleared from any particles of mud that may have lodged in them. On the return stroke the piston acts as an exhauster, and the external air, rushing through the layer of mineral, to compensate for the partial vacuum formed, carries away a considerable portion of the adherent water. The sieves used must be of very fine mesh, so as to be practically impermeable to the mineral while allowing a free air-way. The water level, as well as the discharge of any particles of mud that may pass through the sieves, is regulated by syphons fixed at particular levels in the sides of the hatch. This machine has been adopted at the Sulkow Coal Mine, near Pilsen, in Bohemia, for drying washed slack, the particles gauging one-fifth of an inch and below. The sieves are made of fine hair cloth, and the material leaves the machine sufficiently dried to be fit for charging in the coke ovens.

— By RIEHN, MEINICKE, and WOLFF: Oesterreichische Zeitschrift für Berg und Hüttenwesen.

\* From JAMES FORREST'S "Abstracts of Papers in Foreign Transactions and Periodicals," for the Proceedings of the Institution of Civil Engineers.

OIL V. GAS.—The Romford Board of Health has discussed the respective merits of gas and oil for lighting the public lamps of the town. Both systems have been tried. It was generally admitted that gas gave the most satisfactory and least troublesome light, but it was stated by several members that the board would save 200/- per annum upon the tender of the gas company by continuing to use oil. The number of lamps is 110. Last year the saving through using oil was 125/-, but this year less will be required for plant, &c., and oil is 2d. per gallon cheaper. It was agreed to continue lighting with oil, and the tender of the gas company was rejected.

PROTECTING ARTIFICIAL STONE.—The invention of Mr. W. SMITH, of Dublin, for rendering concrete and artificial stone airtight, consists in bituminising these materials with certain proportions of pitch and creosote, or other heavy oils obtained in the destructive distillation of tar or stone in a hot or cold state, either under the normal atmospheric pressure or any other greater or lesser pressure. The proportions of the mixture to be regulated by the amount of pitch which the oil can dissolve at the required temperature.

HOLLOWAY'S PILLS.—The changes of temperature and weather frequently upset persons who are most cautious of their health, and most particular in their diets. These corrective, purifying, and gentle aperient pills are the best remedy for all defective actions of the digestive organs; they augment the appetite, strengthen the stomach, correct biliousness, and carry off all that is noxious from the system. Holloway's pills are composed of rare balsams, unmixed with base, and on that account are peculiarly well adapted for the young, delicate, and aged. As this peerless medicine has gained fame in the past, so will it preserve it in the future by its remunerating and invigorating qualities, and its incapacity of doing harm.

## “Cranston” Rock Drill



For other particulars and prices, apply to—

J. G. CRANSTON,  
22, Grey-street, Newcastle-on-Tyne.

## WIRE ROPES.

JOHN AND EDWIN WRIGHT,

PATENTEE. ESTABLISHED 1770.

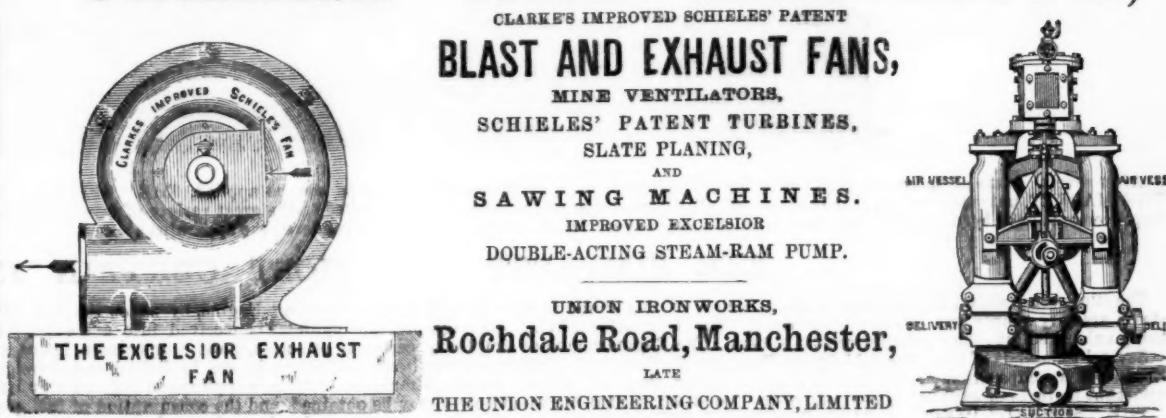
MANUFACTURERS OF EVERY DESCRIPTION OF IMPROVED Patent Round and Flat Wire Ropes,

PATENT ROUND AND FLAT HEMP ROPES, Hemp, Flax, Engine Yarn, Cotton Waste, Tarpauling, Oil Sheets, Brattice Cloth, Wagon Covers, &c., &c.

UNIVERSE WORKS, MILLWALL, POPLAR, LONDON.  
UNIVERSE WORKS, GARRISON STREET, BIRMINGHAM.  
CITY OFFICE, No. 5, LEADENHALL STREET, E.C.

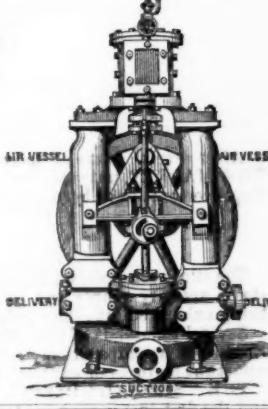
All communications to be forwarded to the BIRMINGHAM ADDRESS.

## CLARKE AND SUTCLIFFE,

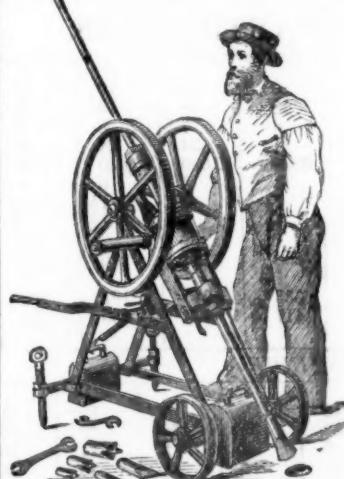


CLARKE'S IMPROVED SCHIELES' PATENT  
BLAST AND EXHAUST FANS,  
MINE VENTILATORS,  
SCHIELES' PATENT TURBINES,  
SLATE PLANING,  
AND  
SAWING MACHINES.  
IMPROVED EXCELSIOR  
DOUBLE-ACTING STEAM-RAM PUMP.

UNION IRONWORKS,  
Rochdale Road, Manchester,  
LATE  
THE UNION ENGINEERING COMPANY, LIMITED



HAND-POWER ROCK DRILL COMPANY (LIMITED).

IMPORTANT IMPROVEMENTS  
APPLIED TO ALL EXISTING JORDAN'S PATENTHAND-POWER ROCK DRILLS  
AT COST PRICE.

RATE OF DRILLING GREATLY INCREASED.

T. B. JORDAN, SON, & MEIHE.

ENGINEERS AND CONTRACTORS,

63, QUEEN VICTORIA STREET, LONDON, E.C.  
ADJOINING MANSION HOUSE STATION; AND AT  
21 AND 22, LINDENSTRASSE, BERLIN, S.W.

## SPECIALITIES:—

PATENT PNEUMATIC HAND AND STEAM POWER STAMPS, CRUSHING ROLLS,  
PATENT PROSPECTING PLANT, &c.

THOMAS TURTON AND SONS,  
MANUFACTURERS OF

MINING STEEL of every description.

CAST STEEL FOR TOOLS. CHISEL, SHEAR, BLISTER, & SPRING STEEL  
MINING TOOLS & FILES of superior quality.

EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS.  
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE and WAGON SPRINGS and BUFFERS.

## SHEAF WORKS &amp; SPRING WORKS, SHEFFIELD.

LONDON OFFICES—90, CANNON STREET, E.C. PARIS DEPOT—12, RUE DES ARCHIVES.  
NEW YORK STORE—102, JOHN STREET.

## ASBESTOS.

A NEW and INDESTRUCTIBLE ASBESTOS PACKING for steam joints and glands, possesses an unusual power of resisting heat, works efficiently under the highest pressure of steam, being practically indestructible. Apply to—

THE PATENT ASBESTOS MANUFACTURE CO. (LIMITED),  
31, ST. VINCENT PLACE, GLASGOW,  
AND 10, MARSDEN STREET, MANCHESTER.

SICKFORD'S PATENT  
FOR CONVEYING  
CHARGE IN



SAFETY FUSE  
FIRE TO THE  
BLASTING ROCKS &c.

Obtained the PRIZE MEDALS at the "ROYAL EXHIBITION" of 1851; at the "INTERNATIONAL EXHIBITION" of 1862 and 1874, in London; at the "IMPERIAL EXPOSITION," held in Paris, in 1855; at the "INTERNATIONAL EXHIBITION," in Dublin, 1865; at the "UNIVERSAL EXPOSITION," in Paris, 1867; and at the "GREAT INDUSTRIAL EXHIBITION," at Altona, in 1869; TWO MEDALS at the "UNIVERSAL EXHIBITION," Vienna, in 1873; and at the "EXPOSICION NACIONAL ARGENTINA," Cordova, South America, 1872.

BICKFORD, SMITH AND CO.,  
of TUCKINGMILL, CORNWALL; ADELPHI  
BANK CHAMBERS, SOUTH JOHN-STREET, LIVER-  
POOL; and 85, GRACECHURCH-STREET, LONDON,  
E.C., MANUFACTURERS AND ORIGINAL  
PATENTEES of SAFETY-FUSE, having been in  
formed that the name of their firm has been attached to  
fuses not of their manufacture, beg to call the attention of  
the trade and public to the following announcement:—

EVERY COIL of FUSE MANUFACTURED by them has TWO SEPARATE  
THREADS PASSING THROUGH THE COLUMN of GUNPOWDER, and BICK  
FORD, SMITH, AND CO. CLAIM SUCH TWO SEPARATE THREADS AS  
THEIR TRADE MARK.

BENNETT'S SAFETY FUSE WORKS  
ROSEKEAR, CAMBORNE, CORNWALL.

BLASTING FUSE FOR MINING AND ENGINEERING  
PURPOSES,  
Suitable for wet or dry ground, and effective in tropical or Polar Climates.

W. BENNETT'S, having had many years experience as chief engineer with  
Messrs. Bickford, Smith, and Co., is now enabled to offer Fuse of every variety of  
his own manufacture, of best quality, and at moderate prices.

Price Lists and Sample Cards may be had on application at the above address.

LONDON OFFICE.—H. HUGHES, Esq., 45, GRACECHURCH STREET

Second Edition. Just published, price 8s. 6d.

A NEW GUIDE TO THE IRON TRADE  
FOR, MILL MANAGERS' AND STOCK-TAKERS' ASSISTANT;  
Comprising a Series of New and Comprehensive Tables, practically arranged to  
show at one view the Weight of Iron required to produce Boiler-plates, Sheet-iron,  
and Flat, Square, and Round Bars, as well as Hoop or Strip Iron of any dimensions.  
To which is added a variety of Tables for the convenience of Merchants,  
including a Russian Table.

Batman's Hill Ironworks, Bradley, near Birston.

OPINIONS OF THE PRESS.  
"The Tables are plainly laid down, and the information desired can be instantly  
obtained."—Mining Journal.

"900 copies have been ordered in Wigan alone, and this is but a tithe of those to  
whom the book should command itself."—Wigan Examiner.

"The work is replete on the subject of underground management."—M. BANKEK  
Colliery Proprietor.

To be had on application at the MINING JOURNAL Office, 28, Fleet-street, London

THE NEWCASTLE DAILY CHRONICLE  
(ESTABLISHED 1764.)  
THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISING  
OFFICES, WESTGATE-ROAD, NEWCASTLE-UPON-TYNE; 50, HOWARD STREET, NORTH  
BRITAIN; 195 HIGH-STREET, SUNDERLAND.



PARIS INTERNATIONAL EXHIBITION, 1867.



VIENNA INTERNATIONAL EXHIBITION, 1873.



LONDON INTERNATIONAL EXHIBITION, 1874.



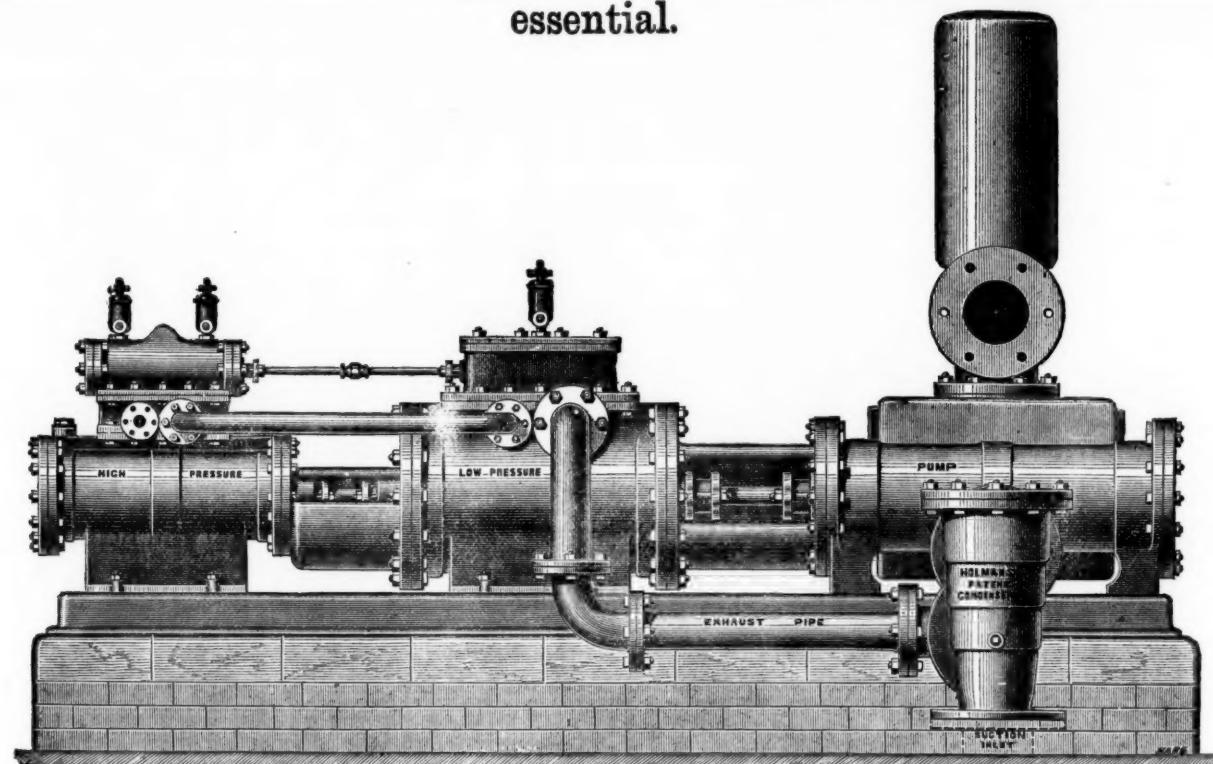
CORNWALL POLYTECHNIC SOCIETY, 1867 and 1873.

# TANGYE BROTHERS AND HOLMAN,

HYDRAULIC AND GENERAL ENGINEERS,  
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,  
AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

## THE "SPECIAL" DIRECT-ACTING COMPOUND STEAM PUMPING ENGINE

For use in Mines, Water Works, Sewage Works, and all purposes where Economy of Fuel is essential.



After several years of successful application for all purposes to which steam-driven pumps can be applied, THE "SPECIAL" STEAM PUMP STILL MAINTAINS THE FIRST POSITION IN THE MARKET, notwithstanding that it alone—of all direct-acting pumps—has been subjected to the great variety of severe tests that must be encountered in such a period of time. Some valuable improvements have been suggested in the course of a long experience, and their adoption has rendered the apparatus at once

### THE SIMPLEST AND MOST CERTAIN IN ACTION.

The illustration shows an extension of the principle of this Pump to a Compound Steam Pumping Engine, by which the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere. The Engine combines simplicity, certainty of action, great compactness, fewness of parts, and consequent reduction in wear and tear.

Several thousands of the "Special" Steam Pumping Engines, with high-pressure cylinders only, are in use in British and Foreign Mines, Water Works, &c., and for confined situations, or where Engines of a comparatively small size only are necessary, they will still meet all requirements—but their application will be very largely increased, since it has been found practicable to embrace the important features of expanding and condensing the steam, so that increased power may be obtained, and the consumption of fuel greatly economised.

THE "SPECIAL" DIRECT-ACTING COMPOUND STEAM PUMPING ENGINE is the most simple appliance for deep mine draining and general purposes of pumping ever practically developed, and the first cost is very moderate compared with the method of raising water from great depths by a series of 40 to 50 fathom lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pit-work are required, while they allow a clear shaft for hauling purposes.

### SIZES AND PARTICULARS.

Diameter of High-pressure Cylinder	8	8	8	10	10	10	10	12	12	12	12	14	14	14
Ditto of Low-pressure Cylinder	14	14	14	18	18	18	18	21	21	21	21	24	24	24
Ditto of Water Cylinder	4	5	6	5	6	7	8	6	7	8	10	7	8	10
Length of stroke	24	24	24	24	24	24	24	24	24	24	24	36	36	36
Gallons per hour approximate	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450
Diameter Suction and Delivery	3	3½	4	3½	4	5	6	4	5	6	8	5	6	8
Diameter High-pressure Steam Inlet	1½	1½	1½	1½	1½	1½	1½	2½	2½	2½	2½	2½	2½	2½
Diameter Low-pressure Steam Exhaust	1½	1½	1½	1½	1½	1½	1½	2½	2½	2½	2½	2½	2½	2½
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	330	160	360	250	184	140	360	264	202	130	360	275	175
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203

### CONTINUED.

Diameter of High-pressure Cylinder	16	16	16	16	18	18	18	21	21	24	24	24	30	30
Ditto of Low-pressure Cylinder	28	28	28	28	32	32	32	36	36	42	42	42	52	52
Ditto of Water Cylinder	8	10	12	14	8	10	12	14	10	12	14	12	12	14
Length of stroke	36	36	36	36	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,950
Diameter Suction and Delivery	6	8	9	10	6	8	9	10	8	9	10	8	9	10
Diameter High-pressure Steam Inlet	2½	2½	2½	2½	3	3	3	3½	3½	4	4	4	4	4
Diameter Low-pressure Steam Exhaust	3	2	3	3	3½	3½	3½	4	4	4	5	5	5	6
Height in feet water can be raised with 40 lbs. pressure per square inch in cylinder	360	230	160	118	456	292	202	149	397	276	202	518	360	264
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352
Ditto ditto ditto—with Air-pump Condenser...	600	384	287	191	750	486	337	248	660	450	337	864	600	440

### PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

AWARDED THE PRIZE MEDALS AT LEEDS, MANCHESTER, AND WREXHAM EXHIBITIONS, 1875 AND 1876.

# HADFIELD'S STEEL FOUNDRY COMPANY,

## ATTERCLIFFE, SHEFFIELD,

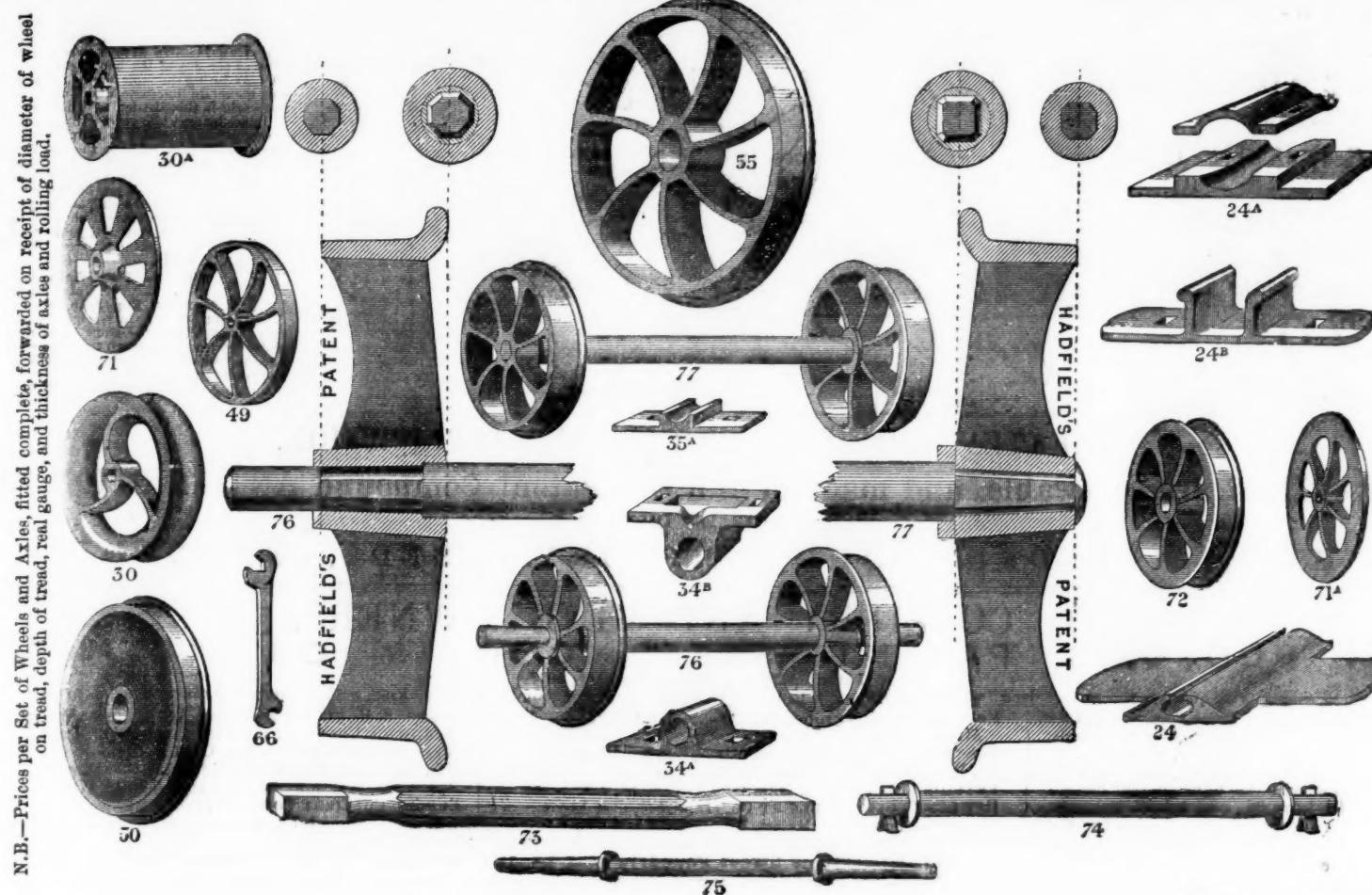
DEVOE THEIR EXCLUSIVE ATTENTION TO THE MANUFACTURE OF

# CRUCIBLE STEEL CASTINGS, for Engineering and Mining Purposes,

AND ARE THE SOLE MAKERS OF

## HADFIELD'S CRUCIBLE STEEL WHEELS.

One of our departments is specially adapted for the manufacture of these Wheels (as shown below), for Collieries, Ironstone Mines, Slate Quarries, Ironworks, Lead Mines, &c., &c. We have made, and are now making, many HUNDRED THOUSANDS; and having Patented a New Method of Fitting Wheels upon axles, being cheap, effective, and expeditious, we can execute orders entrusted to us with promptitude, our capacity in this department alone being equal to about 2000 wheels per week.



[This Sheet of Drawings is Copyright.]

### HADFIELD'S PATENT METHOD OF FITTING WHEELS UPON AXLES.

The advantages of the above system are that the Wheels being forced upon a Taper Square-ended Axle, by Machinery, and then riveted (the machine securing truth), it is impossible that they can come loose or get within gauge. They are very heavily fitted on, and run exceedingly true.

We construct the Arms of wheels upon the curved principle (as shown in the drawings above), consequently the shrinkage or cooling of the Castings is not interfered with, thus securing the greatest advantage of our very strong material.

CRUCIBLE CAST-STEEL WHEELS, when cast by us, are made from one-third to one-half lighter than Cast-Iron. They cannot be broken while working, even with rough usage, and will

wear at least twelve times as long as Cast-Iron, thus saving animal and steam power, and reducing wear and tear immensely.

We would also draw special attention to our INCLINE PULLEYS and CAGE GUIDES, the adoption of which will prove highly advantageous.

## HARRIS'S PATENT WROUGHT-IRON WINDOWS.

### DOME AND OTHER ROOF LIGHTS, FLOOR AND PAVEMENT LIGHTS, ETC.

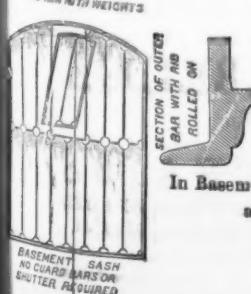


GREAT BRITAIN,  
UNITED STATES OF AMERICA,

ARE STRONGER, SUPERIOR, AND CHEAPER  
THAN ANY OTHER METAL SASHES YET  
PRODUCED—COST LESS FOR GLAZING—  
ARE AS CHEAP IN MANY CASES AS WOOD



Private Houses,  
Parsonage Houses,  
Farm Houses,  
Churches,  
Chapels,  
Schools,

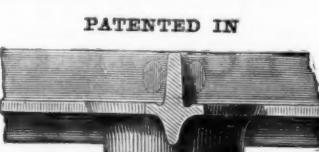


In Basement Storeys and Exposed Positions Shutters  
and Guard Bars are dispensed with.

#### HOME AND

SOLE MAKER—J. T. HARRIS, Engineer, Ironfounder, and Manufacturer,  
SAFE, STRONG ROOM, AND PARTY WALL DOORS, AND EVERY KIND OF CONSTRUCTIONAL AND BUILDERS' IRONWORK, LIFTS, HOISTS, ELECTRIC BELLS AND TELEGRAPHHS, &c.

90, CANNON STREET, LONDON, E.C.; AND BEAUFORT IRONWORKS, BRISTOL.

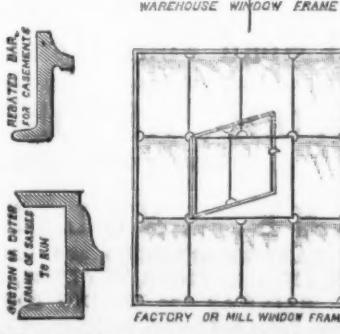
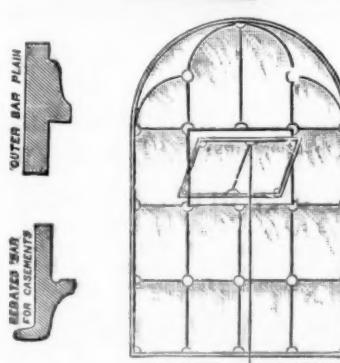


FRANCE,  
GERMANY, AND BELGIUM.

CAN BE DESIGNED AND MANUFACTURED  
TO SUIT ANY STYLE OF ARCHITECTURE  
OR POSITION WHERE A WINDOW MAY BE  
REQUIRED.

ARE BEING EXTENSIVELY USED IN—

Lunatic Asylums, &c.,  
Public Buildings, Banks,  
Wharves, Warehouses,  
Factories, Mills,  
Breweries, &c.,  
Engine Houses.



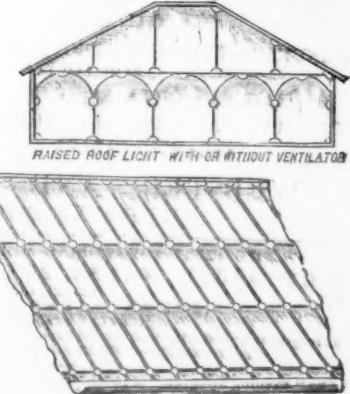
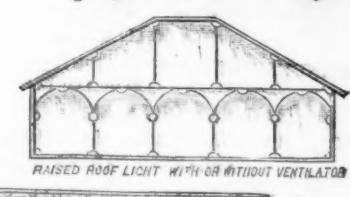
FACTORY OR MILL WINDOW FRAME

ILLUSTRATED CATALOGUES  
ON APPLICATION.

Security is obtained in  
these Skylights without  
Guard Bars, and  
with less obstruction to Light.

SECTION OF SKYLIGHT CROSS BAR

#### EXPORT.



H. R. MARSDEN will exhibit in full operation at the Manchester, Liverpool, and North Lancashire Show, at Lancaster, September 3rd to 5th, one of his

### New patent Stone Breakers, with Screening Apparatus,

And on wheels to travel; also fitted with his NEW PATENT TOGGLE BEARING AND DRAWBACK MOTIONS, and REVERSIBLE PATENT FACED BACK CUBING JAWS in sections. Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

## H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE'S

# Improved Patent Stone Breakers & Ore Crushers.

New Patent Reversible Jaws, in Sections, with Patent Faced Backs.

NEW PATENT ADJUSTABLE TOGGLES.

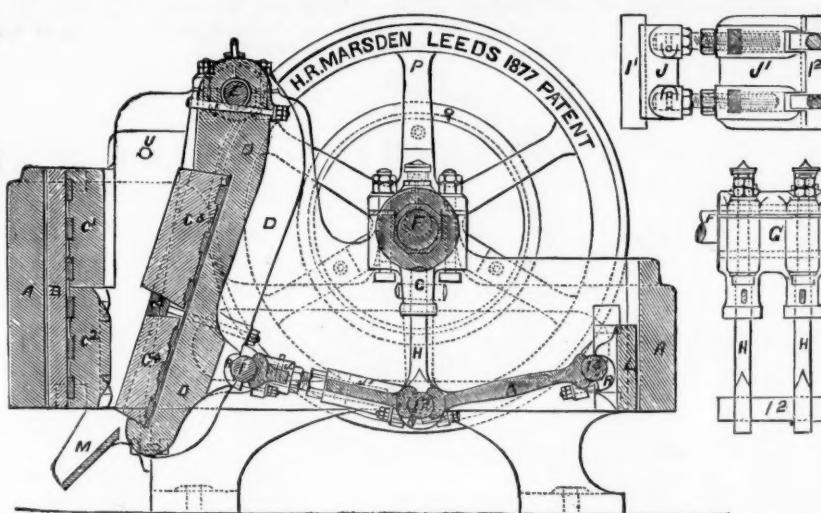
OVER 2500 IN USE.

New Patent Draw-back Motion.

NEW PATENT STEEL TOGGLE BEARINGS.

70

PRIZE MEDALS.



GREATLY REDUCED PRICES ON APPLICATION.

ALL BEARINGS are renewable, and made of H.R.M.'s Patent Compound ANTIFRICTION METAL.

CATALOGUES, TESTIMONIALS, &c.

H. R. MARSDEN, SOHO FOUNDRY, LEEDS, ENGLAND.

### TO COLLIERY AND MINE OWNERS. R. HUDSON'S PATENT STEEL CORVES OR "TRAMS."

Patented July, 1875, and January, 1877.

Entire new principle, saving three-quarters to 2 cwts. "dead" weight per corve. Will hold 2 to 3 cwts. more coal than the ordinary kind, *without increasing the outside dimensions*. Adopted by—  
MESSRS. THOMPSON, WISE, & CO., BURRY PORT, SOUTH WALES.  
MESSRS. DYMOND'S LIVEREDGE COAL COMPANY, NEAR LEEDS.  
MESSRS. W. ACKROYD AND BROS., MORLEY, NEAR LEEDS.  
MESSRS. CLAYTON AND SPEIGHT, FARLEY, NEAR LEEDS.  
MESSRS. JAS. WORMALD AND SONS, RAWDON, NEAR LEEDS.  
KINGSWOOD COAL AND IRON CO., NEAR BRISTOL.  
MIDDLETON COLLIERY CO., NEAR LEEDS. | NEWTON COLLIERY,  
R. HUDSON, Engineer and Ironfounder, GILDERSOME STREET FOUNDRY, NEAR LEEDS (Five minutes walk from Gildersome Station, G.N.R.)

## THE "CHAMPION" ROCK BORER

MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED IRON PIPES, &c.

### Air-Compressing Machinery, ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

CONTRACTS TAKEN, OR SPECIAL TERMS FOR HIRE.

ULLATHORNE AND CO., 63, QUEEN VICTORIA STREET, LONDON, E.C.

## THE ROANHEAD ROCK DRILL.

BY ROYAL LETTERS PATENT.

This justly-celebrated Rock Drill, the only one invented that will work in the hardest rock without more than the usual repairs required by any ordinary machinery, is now offered to the public.

It has been most successfully worked in the well-known Hematite Mines of Lancashire and Cumberland. Will drive 50 to 60 ft. in hard rock without change of drill, and can be worked by any miner, and kept in repair by any blacksmith. It is the most simple rock drill ever invented, and cannot with fair usage get out of order.

Plans, Estimates, including Compressors, and all other Mining Machinery, supplied on application to the sole makers,—

**SALMON, BARNES, AND CO.,**  
MINING ENGINEERS.

Canal Head Foundry and Engineering Works, Ulverston.

## J. WOOD ASTON AND CO., STOURBRIDGE

(WORKS AND OFFICES ADJOINING CRADLEY STATION),

Manufacturers of

### CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions.

STOURBRIDGE FIRE BRICKS AND CLAY.

**THE SOUTH WALES EVENING TELEGRAM**  
(DAILY), and  
**SOUTH WALES GAZETTE**  
(WEEKLY), established 1857,  
the largest and most widely circulated papers in Monmouthshire and South Wales.  
Chief OFFICES—NEWPORT, MON., and at CARDIFF.

The "Evening Telegram" is published daily, the first edition at Three P.M., the second edition at Five P.M. On Friday, the "Telegram" is combined with the "South Wales Weekly Gazette," and advertisements ordered for not less than six consecutive insertions will be inserted at an uniform charge in both papers.

P. O. O. and cheques payable to Henry Russell Evans, 14, Commercial-street, Newport, Monmouthshire.

**THE IRON AND COAL TRADES' REVIEW.**  
The IRON and COAL TRADES' REVIEW is extensively circulated amongst the Iron Producers, Manufacturers, and Consumers, Coalowners, &c., in all the iron and coal districts. It is, therefore, one of the leading organs for advertising every description of Iron Manufactures, Machinery, New Inventions, and all matters relating to the Iron, Coal, Hardware, Engineering, and Metal Trades in general.

Offices of the Review: 7, Westminster Chambers, S.W.

Remittances payable to W. T. Pringle.